COAL AGE

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Results of the Year 1916 in the Coal and Coke Industries

THE PAST YEAR was the most profitable period ever experienced in American coal mining and coke manufacture. The value of the coal produced this year in Pennsylvania alone was practically four times as great as the value of the gold mined in the entire United States and its possessions. West Virginia's coal output at the mine mouth was equal in value to almost double this country's 1916 gold production.

The increase in coal production in 1916 *was* 50,824,725 *short tons or* 9½ *per cent. The increase in coke was* 9,963,297 *short tons or* 24 *per cent. Exports were greater than in any previous year.*

THE COAL RESERVES of the world amount to 7,500,000 million metric tons, of which total the United States holds 51.8 per cent.; Canada comes next with 16 per cent., China third with 13 per cent. and Germany fourth with nearly 6 per cent. In the matter of output the United States, Great Britain and Germany produce more than 83 per cent. of the coal consumed in the world. The United States alone produces nearly one-half the world's fuel supply.

THE 1916 BITUMINOUS OUTPUT was 494,132,212 short tons; the anthracite production was 88,312,000 tons. This compares with 442,624,426 tons of bituminous and 88,995,061 tons of anthracite in 1915. The large increase in bituminous was supplied principally by Pennsylvania, West Virginia, Ohio and Kentucky. The Ohio output was the most noteworthy feature of the year. Its percentage increase in production was greater than any other state.

THE ANTHRACITE MINES did remarkably well, considering that they operated under the handicap of a 20 per cent. labor shortage. The production decreased less than 700,000 tons. Of the 75,712,000 tons sent to market, the Philadelphia & Reading R.R. handled 13,218,339, the Lehigh Valley 12,423,119, and the Delaware, Lackawanna & Western 10,840,080. Notwithstanding the slightly smaller production, more anthracite was marketed in 1916 than ever before in the history of the trade. More than 5,000,000 tons were shipped from the storage yards.

THE PRODUCTION OF COKE in 1916 was greater than any other year in history. The output totaled 51,544,447 short tons as compared with 41,581,150 tons in 1915. The Connellsville region supplied 21,654,502 tons of coke having a value of $55,768,615 at the ovens. Compared with last year, the Connellsville production increased 20 per cent. in volume and 70 per cent. in value. In value of product, the record of the year in Pennsylvania was 6 per cent. less than in 1913, the banner year. The average price of Connellsville coke this year was $2.58 per ton at the ovens, which compares with $2.95 per ton in 1913. In Alabama and other important coke states, both the tonnage and value exceeded the records of all other years.

EXPORTS OF COAL to the purely foreign markets in 1916 show a considerable loss; the principal falling off was in the exports to Italy. Shipments to South American markets made a gratifying increase. Shipments from Hampton Roads increased while those from Baltimore declined. Canada took nearly 16,000,000 tons of our coal, as compared with less than 12,000,000 tons last year. This large trade with Canada overcame the loss in exports to offshore points and made 1916 the greatest year in the history of the export trade.

Reviews of Coal Mining for 1916

Alabama

By C. H. Nesbitt*

In the absence of accurate figures, it is believed that a conservative estimate of the coal production in the State of Alabama during the year 1916 would be 16,250,000 short tons and that 4,250,000 short tons of coke will be manufactured.

Byproduct and beehive ovens have been active, owing to the increased demands for iron and steel. The prices for coal have been greatly stimulated recently on account of the increased activities and also because of the shortage of railroad cars. Many abandoned coal mines have been opened for business and in addition a large number of new mines have been put into operation. The prospect is that other properties will be put in shape for trade.

The price paid for mining has been the highest known in the history of the state. The barge-line trade on the Warrior River has been increased materially to points in the South and Southwest. Many new steam-coal contracts have been renewed at highly satisfactory prices for 1917.

If the present rate of progress continues during 1917, that year will show the largest coal and coke production Alabama has ever had. Interruptions by reason of the flood conditions in July, 1916, caused several of the important operations to suspend for several months. The Gulf States Steel Co. is about to complete 39 byproduct ovens of the Koppers type. There are many beehive ovens scheduled to start as soon as the necessary preparations can be made.

Alaska

By Sumner S. Smith†

The most important event in the Alaskan coal industry in 1916 was the announcement by the Government of the reservations and leasing units in the Matanuska and Bering River fields together with the rules and regulations governing the operation of mines under the Coal Leasing Act. In response to this publication a number of bids have been submitted varying from $50,000 to $2,000,000. These have been advertised in various periodicals and newspapers and time allowed for competitive bids, though owing to the length of time necessary for this publicity no active development has been commenced in either field. The Alaska Engineering Commission has completed the Government railroad from Anchorage to Kings River in the Matanuska field, and private interests allied with the Alaska Petroleum and Coal Co. have undertaken the construction of a standard-gage railroad from Goose City on Controller Bay in the Bering River field to the company's holdings on Canyon Creek.

The free-use ten-acre permits, which apply to all coal land outside the Bering River and Matanuska fields, have been freely used to supply coal for local needs. During the spring application was made by William Martin to mine coal on Moose Creek in the Matanuska field, and before he could be advised that his application was not accepted his foreman had driven a short drift and taken out about a hundred tons of coal. This was hauled to the Willow Creek district, about 20 mi., and used for domestic purposes in the camp of the Alaska Free Gold Mining Co., which is under lease to Mr. Martin.

The only free-use ten-acre permit granted within the surveyed area in the Matanuska field was given to R. G. Doherty, who secured a contract to furnish the Alaskan Engineering Commission with 2000 tons of coal. The property is situated on the west bank of Moose Creek, about 1½ mi. above the railroad right-of-way. An entry was driven on a bed which strikes S. 55 deg. W. and dips 53 deg. S.E. with an airway 15 ft. above this. From the airway 24-ft. breasts were turned off, separated by 10-ft. pillars, all ventilation being natural. No gas was found in this bed, which is approximately 5 ft. thick with the following cross-section:

	Ft.	In.
Hard sandstone hanging wall	..	...
Scaly sandstone with stringers of coal	..	4–6
Hard black coal with many niggerheads	1	6
Shale parting	..	...
Fairly hard black coal with irregular fracture and no well developed cleat	1	...
Lignitic coal with woody structure	1	6
Soft dark-brown shale	..	6
Hard sandstone footwall	..	...

There are several other partings in the bed, but they seem to lack regularity. When this property was opened in such a manner that coal might be supplied to the commission a permit was granted to mine and sell to local consumers. A little over 4000 tons was mined by Mr. Doherty for Government contracts and local sale.

The next most important producer in line of tonnage was John A. Herbert, who secured a permit to mine coal at Bluff Point, about 14 mi. north of Seldovia on Cook Inlet. Here a 6-ft. seam of lignite, the pitch of which was approximately 8 deg., was opened by a drift on the bed and an air shaft for ventilation. Both walls are sandstone and the coal is fairly clean, giving a fair domestic product. The property is nongaseous and only eight men have been employed underground. The coal was shipped to Anchorage, Seward and Seldovia, the total amounting to 1500 tons.

The Happy Valley Coal Co., also operating near Bluff Point, made a small production which was shipped to Anchorage, and application was made for a lease on a larger area that the company might ship coal to the States. Under the provision of the ten-acre permits the coal must be used locally.

The Cache Creek Dredging Co. secured a permit near its dredging ground on Cache Creek in the Yetna valley and mined about 20 tons of coal per day during the dredging season to supply fuel for the camp and the boilers on the dredge.

A small amount of work was done by Harry Dugdale on the patented ground of T. P. MacDonald in the Bering River field, and operations were resumed at the property of the Alaska Petroleum and Coal Co. in the same field, where patent was granted by the Government to 160 acres.

The scattered locations of the permits and the intermittent work on mining makes accurate estimates of the tonnage produced impossible, but it is probable that the total production for the year approximated 9000 tons. No coke was manufactured nor was any coal shipped out of the Territory.

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The following list of permits granted gives an idea of the areas covered:

Operator	District
Raymond W. Silver	South shore Knik arm on Cook Inlet
I. D. Nordyke	Kachemak Bay, Cook Inlet
Ralph V. Anderson	Kachemak Bay, Cook Inlet
George A. Estabrook	Chicken Creek, Forty Mile
Robert Brown	Watershed between Koyuk and Kewalic Rivers
George Wallin	Kugruk River between Montana and Reindeer Creeks
George F. Hendricks	Kootznahoo Inlet, Admiralty Island
Cache Creek Dredging Co.	Cache Creek, Yetna Valley
John A. Herbert	Bluff Point, Cook Inlet
Frank Wells, A. O. Wells, John Coffey	Coal Creek, Shulitna Valley
William Knox, Charles Krutsinger	Iditarod
J. R. Uhl	8 miles north of Anchor Point, Cook Inlet
R. G. Doherty	Moose Creek, Matanuska field
Fredrick Brassell	Lower end Matanuska field, outside surveyed area
Robert M. Aistrop	Shore Cook Inlet, 24 miles south of Kasilof River
William Maitland, L. S. McLennon	Carpenter Creek, Matanuska field, south of surveyed area

Arkansas

By Thomas H. Shaw*

The production of coal for the fiscal year ending June 30, 1916, was 1,910,298 short tons, valued at $3,452,717, an increase of 210,199 short tons over the production for 1915.

The production for the calendar year will exceed 2,000,000 tons. Owing to the location of several smelters at Fort Smith, the coal trade in Sebastian County looks brighter now than ever before in the history of the state. The use of soft coal at the smelters has been instrumental in opening several strip pits near Midland and Hartford. This coal could not be marketed as a commercial fuel until the smelters entered the field.

The Central Coal and Coke Co. has leased Mine No. 4, formerly operated by Bache & Denman. The surface equipment of this mine was destroyed by a mob July 17, 1914. The mine is rapidly being dewatered and will likely be operating within the next six months. It is said that approximately $100,000 will be spent in equipping this mine, and that about 350 men will be employed when the mine is ready for work. The Central Coal and Coke Co. has made many improvements at its No. 6 Mine at Huntington, and now has 357 men employed. The daily output is 1300 tons. Mining machines have been taken out of this mine and it is now being worked by shooting off the solid.

Two new shafts will be in operation in a short time—Collier-Dunlap Coal Co. at Hartman and Woodson Coal Co. at Hartford.

There are 5660 persons now employed in and around the mines, including office men and mine officials. There are 148 mines in the state, 50 shafts, 82 slopes, 13 drifts and 3 strip pits, ventilated by 51 fans, 21 furnaces; 76 have natural ventilation. There were 4069 miners and company men employed for the fiscal year ending June 30, 1916. The miners used 78,734 kegs of black powder at a cost of $157,468. The mines hoisted coal 15,212 days. There were 10 fatal and 135 nonfatal accidents. There were 191,030 tons of coal mined for each life lost and 14,150 tons for each nonfatal accident.

The production of coal and the number of fatal accidents for the past three fiscal years is as follows:

Year	Short Tons	Number of Fatal Accidents
1913	1,952,461.93	10
1914	2,136,783.59	15
1915	1,700,099.52	7

*State mine inspector.

The production of coal for the fiscal year ending June 30, 1916, by counties is as follows.

	Short Tons	Value
Sebastian County	1,350,148	$2,161,000
Franklin County	224,594	404,268
Johnson County	207,214	518,035
Pope County	85,590	267,370
Logan County	32,805	82,013
Scott County	7,953	6,644
Crawford County	4	12
Washington County	1,991	6,322

Colorado

By A. R. Tibbitts*

In common with all phases of commercial activity in every part of the world the Colorado coal industry has many problems that still remain unsolved.

During the past year there has been a decided improvement in the whole tone of the business. Notwithstanding the fact that in that period the output increased 1,545,551 tons, the operators were unable to entirely fill the demands made on them. The normal annual production of the state is in the neighborhood of 10,000,000 tons and but for several serious obstacles that hampered the production of the mines, this would have been exceeded by fully 10 per cent.

While the production has varied from year to year, the continued activity in the development of the state's resources cannot help but greatly increase the demand for fuel. The loss of business caused by the lamentable strike of 1913 has been recovered, and it is to be earnestly hoped that Colorado will never again go through such a trying experience. The following table showing the production for the past few years will serve to illustrate the loss which this strike caused:

Year	Coal Produced, Tons
1911	10,197,595
1912	11,016,948
1913	9,268,939
1914	8,201,423
1915	8,715,397
1916	10,260,948

Judging from the output of 1916, together with the general prospects in the commercial condition of the state, there is no reason to believe that the Colorado coal output will ever again fall below the ten million ton mark.

The wages of all classes of labor employed at the mines has been voluntarily raised by the operators. This movement was commenced early in the fall by the Colorado Fuel and Iron Co. in the south and reached the northern field in the month of November. There is no uniform wage scale in the Colorado coal mines, the varying working conditions making this an impossibility.

Usually in the fall of each year there is a shortage of railroads cars that hampers coal shipments. In the fall of 1916 this shortage was acute on account of the lack of stock cars, which were pressed into service to carry the heavy shipments required by the war situation, the fall shipments of sugar beets to the factories and other farm products. This condition compelled many mines to work short time, particularly in the northern lignite fields. There was also a considerable scarcity of labor, especially in the southern field.

The increased cost of production, the causes of which are obvious, resulted in several sharp advances in price. The limited output, on account of the scarcity of labor, the shortage of railroad equipment and an unusually

*Hotel Auditorium, Denver, Colo.

heavy demand for fuel were strong factors in the raising of coal prices. The increased cost of all material needed in the operation of mines, the car supply, which would only permit mines to be operated upon short time with practically the same dead expense as would be necessary for full time, were potent in making these advances necessary.

The greatest difficulty is in supplying fuel for steam purposes, for which lignite slack was extensively used. The first grade of this commodity is now selling at $2.65 per ton f.o.b. Denver, and the second grade at $2.40 per ton. It is reported that only 25 per cent. of the present demand for lignite coal is being supplied, and the supply of this fuel is limited on the local market to each day's receipts.

Conditions in the South

The result is that the best grade of lignite coal sells for $5.50 per ton, other grades from $5.25 to $3.75 per ton. Lump coal from Routt County (which is of the bituminous variety), which sold at $5 per ton last summer is now selling at $6.50, with the demand exceeding the supply. In the Steamboat Springs district, Routt County, in which there are several large coal mines, the car situation was such that not only the operators of mines were hampered but there was also considerable danger of the surrounding district suffering from a condition approaching that of a coal famine.

In the south, where the great bituminous mines are located, the price for the best grades is $5.75 and the second grade $5.50 per ton. The Colorado Fuel and Iron Co., the largest producer of the state, was slow in making any increases, desiring to establish a steady price for their best grade at $5.50 per ton. However, in Fremont County, which ships an excellent grade of semibituminous coal, the Canon City coal of the Colorado Fuel and Iron Co. advanced in price from $5.50 to $6 per ton. Lignite slack being practically unobtainable at any figure, bituminous slack is in strong demand.

In the southern district miners received 55c. per ton and were raised to 58c. In Boulder County (in the north) the increase was from 63 to 68c. per ton. Company men received a raise of 5 per cent. Men employed as laborers in Boulder County now receive $2.94 per day, the same class of labor in the south receives $2.52; engineers in the north receive $3.46½ per day and in the south $3.13.

In Weld County, which adjoins Boulder and also produces a lignite coal, the price paid to miners is less than in the former county because in Weld County the coal beds worked are 10 ft. in thickness, while in Boulder County the coal measures are only half that thick. Consequently, the miners in Weld County were raised from 63 to 65c. per ton, men employed by the day from $3.20 to $3.30 per day and engineers from $3.20 to $3.36 per day.

A few of the small operators have not yet come forward with an increase in the wage scale although asking the advanced market prices for their product. In the west end of the state, in Mesa County, where a semibituminous coal is mined, the day men received a flat increase of 35c. per day and the miners an increase of 10c. per ton. This advance was granted without solicitation.

Most of the coal mined in Colorado is consumed within the state, only about 20 per cent. being shipped out. The product of five mines in Las Animas County and one in La Plata, amounting to about 1,320,000 tons annually, is made into coke.

Few new coal properties were opened and none on a large scale. Routt County was the only field where new openings were made.

There were no labor disturbances during the year other than a few local ones that were speedily adjusted. The most encouraging factor in summing up the year's result is the decrease in the rate of fatal accidents, which was cut down from 5.1 per 1000 men employed in 1915 to 2.58 in 1916.

Following is a summary by counties of the coal production for the year. As all the figures are not available at the date of writing, a conservative estimate is made for the months of November and December.

PRODUCTION BY COUNTIES AND INCREASE OR DECREASE FOR 1916

Counties	Total Production	Increase	Decrease
Archuleta	.....	.....	1,255
Boulder	1,199,590	228,230	.....
Delta	64,545	.....	13,295
El Paso	301,066	3,185	.....
Fremont	541,559	48,535	.....
Garfield	120,318	.....	22,641
Gunnison	496,106	55,142	.....
Huerfano	1,664,950	67,122	.....
Jackson	41,844	14,863	.....
Jefferson	149,192	22,239	.....
La Plata	106,713	.....	10,679
Las Animas	4,138,334	1,152,673	.....
Mesa	113,771	17,968	.....
Moffat	200	.....	.....
Montrose	572	.....	274
Montezuma	900	58	.....
Pitkin	39,630	.....	11,659
Rio Blanco	2,472	2,472	.....
Routt	864,809	18,350	.....
Weld	414,377	.....	25,483
	10,260,948	1,630,837	85,286
Net increase	.....	1,545,551	.....

Illinois

From an operating viewpoint 1916 was a year of problems, starting off with many disappointments, followed by annoyances, and finishing up exceptionally well in a financial way with troubles that while minor were numerous.

There were many unreliable forecasts of what the new wage scale would be, and these kept the operators guessing and figuring on ways to combat some of the anticipated grievances that the mine workers talked about introducing.

When the Illinois miners met in Peoria in March they had many demands to take up. The convention adjourned to New York City. From the very start of the conferences, however, there were indications that there would be no suspension, and this belief proved to be correct.

Wage increases in Illinois were as follows: Machine mining—Danville district, from 51c. to 54c.; Central Illinois, 54c. to 57c.; Southern Illinois, from 50c. to 53c. Pick mining—Danville district, 61c. to 64c.; Central Illinois, 61c. to 64c.; Southern Illinois, 57c. to 60c. The day workers got an increase of 5 per cent. instead of the 20 per cent. asked. The deadwork increase to the miners was 5 per cent. The Illinois operators stood firm in refusing the weekly payday and the 8-hr. day.

One of the facts brought out at the New York meeting was that while the cost of living had gone up about 11 per cent., the miner who rented company houses paid the same rent as for several years past in spite of advancing taxes, increased cost of maintenance, etc.

The great problem facing Illinois operators is to find a logical market for an increasing tonnage. Crowded out of the Gulf markets by the nonunion fields of Alabama

and Kentucky, the Illinois producers have been forced to realize that their market is drawing closer every year as regards permanent business.

The nonunion competition of the South cannot be overcome with an ever-increasing wage scale. There has been thought given to proposing to the miners that on coal produced to meet nonunion competition the union officials allow a rebate arrangement with the operators. This tonnage could be easily ascertained by railroad records.

One thing is certain, even if the United Mine Workers of America does not increase its membership in Illinois, it will not be long before the working time in the various mines will have to be reduced to provide employment for all the miners, unless the Illinois market is widened.

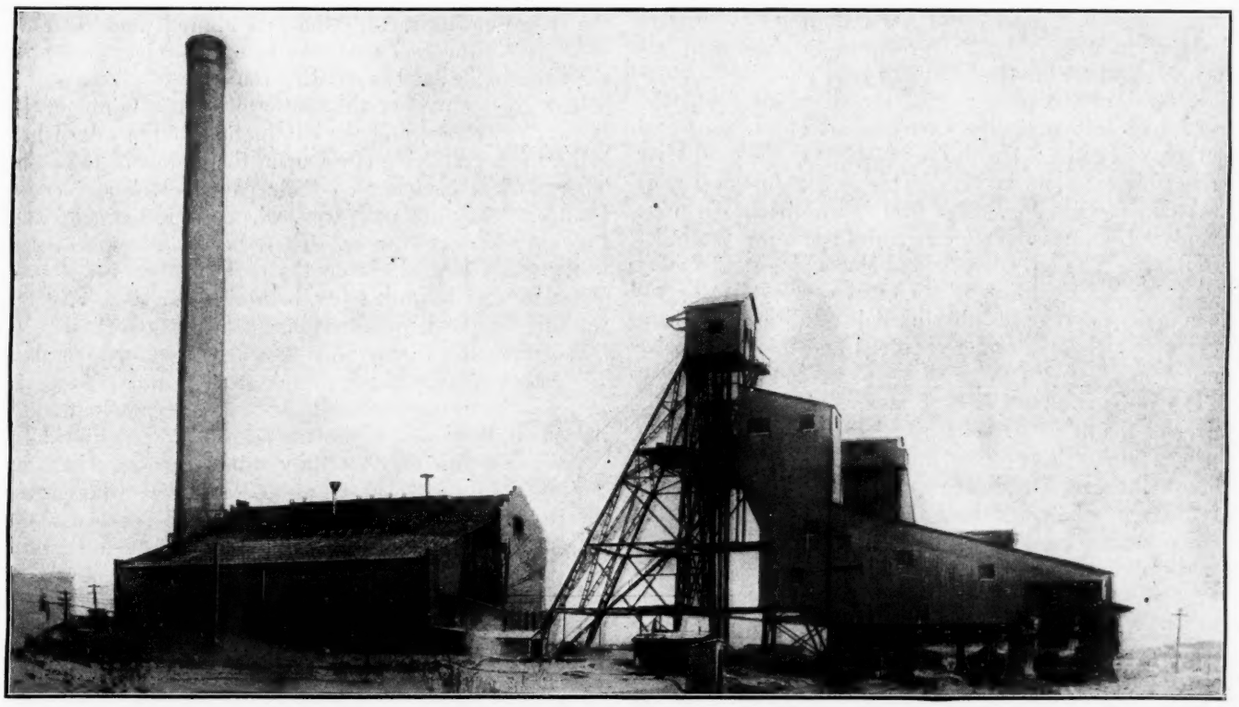
Operators in the Springfield district discussed the general adoption of machines to bring down the cost to enable them to reach out to markets in other fields. The miners took exception to this and stated that they would not tolerate anything that would throw their members out of employment. In the Standard field they took the same position, not only on the machine proposition, but where a change was made in haulage from mules to motors. There were no serious disputes but there was dissatisfaction.

The miners fail to see that their idea of doing less work and getting more for it is causing a loss of tonnage to their own mines and an enforced idleness, beyond what they themselves desire. The more conservative know that it would be better to work five days a week and make $20 at a lower scale than to work three days a week and make $18. The lower scale will enable the operator to reach out and fight the nonunion coal of the South, thus keeping in line a big summer market that will give them work at a time when the North has no demand.

Increasing rates to the Northern and Western markets are slowly forcing Illinois coals out of Kansas and Nebraska. None goes to North Dakota now, and South Dakota and Minnesota are letting up on it in favor of Eastern coals via the Lakes. The Chicago and Alton R.R. came to the relief of its operators in the Springfield district by reducing the rate on steam coal from $1.90 to $1.25 to Kansas City, Mo. This caused much bitterness among the operators in the Southwestern districts of Missouri, Kansas, Arkansas and Oklahoma. They fought against this invasion of their logical market but lost before the Interstate Commerce Commission. The Interstate Commerce Commission also upheld the 5½c. increase proposed last year by the railroads on St. Louis shipments and ordered for Sept. 1 an increase in rates of 5c. to all Illinois, Indiana, Wisconsin and Michigan points, thus giving the dock shippers an advantage in the Lake regions. West of the river the increase was 10c. a ton. There has been a continual fight against increasing rates, but the railroads always win.

While there has been no general complaint about the prorating of equipment by the railroads, some of them have been disagreeable in placing the records of distribution data at points where they are inconvenient for inspection. The Baltimore & Ohio R.R. took a case to the state supreme court, refusing to comply with the rulings of lower courts that it must change its method of distributing coal cars to mines in Illinois. The railroad gave cars in proportion to the shipments of each mine for the preceding year. The court ordered cars furnished for the needs of the mines, regardless of past shipments.

With several big railroads putting in stokers for screenings on their engines, the Illinois operators see some relief in realizing a reasonable price for this size both summer and winter. The Chicago, Burlington & Quincy R.R. is the chief coal-carrying road that is rapidly putting these in, and screenings that in the past were



POWER HOUSE AND TIPPLE, CHRISTOPHER COAL MINING CO., CHRISTOPHER, FRANKLIN COUNTY, ILL.; TYPICAL OF RECENT CONSTRUCTION IN ILLINOIS

dumped on the market during the autumn months, for little more than the cost of freight, will continue to grow in demand. Locomotives eat up coal in cold weather, and there will seldom be a surplus, for the big roads are arranging for special storage plants. The Frisco System out of St. Louis will start 1917 with a large number of stoker-fed engines.

Several mines were equipped this year with crushers to reduce mine-run or other surplus sizes to locomotive stoker size.

There were no changes to speak of in the Jackson County field except the starting up of the mine at De Soto in a small way. Much improvement was made in the plant at Hallidayboro. Options were taken on several thousand acres of outcrop stripping leases and also shaft leases. In Perry County there was the usual activity. These latter mines are mostly big ones and work steadily. The old mines still putter away when prices are high There is some speculation as to the further development of a large acreage recently optioned.

In the Standard field of St. Clair, Washington, Randolph, Clinton, Madison and Bond Counties there were changes, failures, sales and resales, openings and reopenings and all kinds of troubles too numerous to mention. One of the producers of the Standard field, who was forced into bankruptcy on account of the poor coal market, will come out with over $50,000 to the good after paying his creditors in full. This is the Joseph Taylor Coal Co., of O'Fallon. The firm is dissolved, one mine abandoned, and two other companies operating the other two mines. The Mt. Olive field of Macoupin, Montgomery and Christian Counties, where great conservative operations exist, developed no unusual conditions. There were a few changes and reopenings and many extensive improvements.

The resignation of F. S. Peabody, of Chicago, as receiver of the mines at Witt, Kortkamp, Nokomis, Taylor Springs and other points on the Chicago & Eastern Illinois R.R., resulted in the appointment of T. C. Keller, of Chicago, who used the large Keller Coal Co. organization to market this tonnage. Some hoisting records for the state were broken during the year in this field.

Conditions Were Similar

The conditions in the Springfield district with Sangamon, Logan, Macon and Menard Counties, as well as the Peoria field further north with Peoria, Tazewell and Fulton Counties, were much the same as those in the Standard field, but not so pronounced as to failures. These fields have been coming forward more in the manner of successfully conducted business operations than formerly. They have their operating bureaus, which systematize the cost of mining and marketing coal under all conditions. Heretofore this was largely guesswork.

The Harrisburg field of Saline and Gallatin Counties continues in a conservative way and with an increased tonnage. There was little out of the ordinary in this district the past year other than the gradual preparation for the further development of Saline County near the Williamson County line. Some big projects are under way here that 1917 may see fulfilled. These operators are for the most part organized as in other districts. Gallatin County is not in as a whole, being like Williamson County, where about one-third of the operators are not members of the bureau.

In the so-called high-grade field of Williamson and Franklin Counties there is the undeveloped coal county of Jefferson in the same zone. While there is no activity in mining in this county, it will be the greatest producer in the state when it does "come in." The Geological Survey announces that the three counties had originally 8,732,000,000 tons of coal of which 206,000,000 tons, or 2.35 per cent, has been mined in Williamson and Franklin Counties. With the same production and recovery ratios, the No. 6 seam will last about eighty years. The No. 5 seam is workable, but at a much higher cost than the No. 6. The other seams are of somewhat doubtful value, with the present methods of working thin, deep-down veins.

In the spring months of the year the Russell Sage Foundation made an investigation and report on the depressed condition of the coal industry in the Springfield district. It contended that out of 300 working days this district worked 181. That "there are fully three times as many coal mines running as are necessary to meet the demand for fuel." Also "one-half of the coal miners of the state working steadily the year around would be able to mine all the coal that was being mined annually in the years immediately preceding the survey."

The greater part of the southern Illinois mining field is "dry" territory, and the elimination of the saloon has had a most gratifying effect upon the morals of the men. There is less tendency on their part to seek and court trouble. They are not given, when sober, to imagining that they have grievances. There has been less cause for worry and watchfulness on the part of the mine bosses. When men go to work sober, both above and below, more working time and a greater tonnage per man is the result. The mine office force finds less trouble now with but few cases of garnisheeing and attachments. There is better order in the towns, almost no poverty, and an inclination on the part of all for higher ideals.

At a meeting of 35 county mine inspectors held at Springfield in October, "face bosses" were favored for all Illinois mines. The duty of the face boss would be to inspect the face frequently as to the safety for undercutting. Some large mines have face bosses. A holder of a manager's certificate would qualify to serve. There are tables to show that a lower per cent. of accidents occur where there are face bosses than otherwise.

Relief of Miners' Families

The State Board of Administration at Springfield announced in August its plan for the distribution of the $26,000, appropriated by the General Assembly for the relief of the families of miners killed at the Royalton mine on Oct. 27, 1914. With the exception of $1000 to defray the expense of the board, the money will be prorated among the 55 families. Allotments were made to one miner who was seriously injured and to two who went insane as the result of the disaster. Each widow will receive $15 per month as long as the fund lasts. For each child under 14 she will receive $5 a month. Orphans will be paid as a family the same amount as if the mother were living.

The largest amount will go to Mrs. Mary Smiddie with nine children, six of whom are under 14 years of age. She receives $45 per month. This is the same plan as was adopted for the Cherry disaster survivors. The fund will last about two years.

In January the men at Cherry, where more than 200 miners lost their lives in the mine disaster of 1909, gave a testimonial of their gratitude to the American Red Cross for the relief work at the time of the disaster by sending $3000 for Red Cross relief work among the unfortunate people of Poland.

The mine workers of Illinois withdrew the clause against members joining the state militia at the Peoria meeting in April. Members must not belong to detective agencies. Threatened prosecutions against union officials for excluding members of the National Guard from the organization brought this action. Excluded miners were reinstated.

The new agreement in Illinois does away with an old grievance of the miners. No mine boss or official must accept a fee from anyone for a job at the mine. Nothing can be accepted for the allotment of "good places" by mine bosses. No discrimination must be made in favor of men as regards work, places, etc., who rent company houses or buy building lots from the company that employs them.

There were no great mining disasters in Illinois in 1916. There was the usual run of premature "shots" among shotfirers, several small explosions of gas pockets, and a few fires of no consequence. The north mine at Royalton (of the 1914 calamity) seems unlucky. After a cyclone wrecked it and took its death toll, a fire visited it in August and destroyed the tipple and a portion of the top works. The reports for the year, however, will show a smaller percentage of fatal and nonfatal accidents than for any previous year in the history of the coal industry of this state.

With the prospects of a railroad strike gone on Sept. 1, there confronted the operators the greatest car shortage in the history of the coal trade. With high prices in view, every mine in the state was ordered reopened.

There has been an inclination on the part of many operators to keep abreast of the times by installing the latest devices for the preparation of coal. This has resulted in many improvements in all districts. The same feeling exists as regards the facilities offered for the comfort and general good of the employees. A studious aspect is that of watching the progress of mine-machine improvement, and every opportunity is given to develop the safety and economy of the underground work. Mules are being eliminated in many mines by storage battery and gasoline motor gatherers, delivering to high-power motors for the bottom. Southern Illinois operators, especially, are willing pioneers in demonstrating the value of anything new.

The last working day in 1916 showed but one idle mine in the Williamson County field, the Keystone mine at Pittsburg. This was sold the latter part of the month to George J. O'Brien, of Pittston, Penn., for $24,500. The cost of the property was close to half a million. The Pittsburg mine at Pittsburg near Marion resumed operations, as did also the Wallace mine near Marion. The mine of the Cambria Coal Co. northwest of Johnston City, owned by J. L. Mitchell and others, came into the market as a factor.

The year wound up especially gratifying to the operating end from practically every angle and left the owners in a position where 1917 starts off with the best prospects that any new year has ever revealed to the coal industry of Illinois.

Indiana

By Michael Scollard*

The output of coal, and the mining industry in general, in the State of Indiana, during the fiscal year ending Sept. 30, 1916, was much better than was expected during the summer months. There was some time lost in April, when the new wage scale went into effect, the miners being dissatisfied with the mine-run clause in the new contract, claiming that it meant a reduction.

Two strikes were authorized by the miners' organization in District 11. The Gould Coal Washing and Mining Co. equipped its mine tipple with double weigh pans or hoppers, paying the miners for mine-run coal, and screening the coal before it was dumped into railroad cars. The miners contended that the system was a violation of the contract. A strike followed, lasting 190 days and affecting about 200 employees.

The Vandalia Coal Co. made an effort to install electric safety lamps in its No. 10 mine. The miners refused to use them until certain conditions in the mine were removed. A strike was declared on July 22 at that particular mine, and on Sept. 12 a strike order was issued affecting all the mines of the Vandalia Coal Co. This call affected about 2200 miners, all of whom were out at the close of the fiscal year.

Production Was a Record

Notwithstanding the time lost in 1916 on account of the slight demand during the summer months, the above mentioned strikes, and a car shortage, the total production of coal from mines employing ten or more persons was 18,238,256 short tons. This is the greatest number of tons produced in a single year in this state from than ten miners is 500,000 tons, making a total of 18,- mines under the jurisdiction of the mining department.

The estimated production of mines employing less 738,256. This does not include coal produced by strip mines, which do not come under the jurisdiction of the department. In this state the stripping system is used where the overburden can be removed economically by steam shovels or other mechanical means, thus exposing the coal. There were ten of these plants in operation at the close of the fiscal year. One of the largest plants of this kind is operated by the Globe Mining Co. and is located 1½ miles southeast of Staunton, on the Pennsylvania R.R. From 14 to 40 ft. of overburden is removed from what is known as the No. 3 bituminous coal, which ranges from 5 to 7 ft. in thickness. The capacity of this plant is about 20,000 tons of clean coal per month. Many others produce from 2000 to 10,000 tons monthly.

The amount paid to miners during the fiscal year was $15,665,359. This amount does not include wages paid to miners working at strip mines, or at mines employing less than ten persons, which mines do not come under the jurisdiction of the mining department.

Three new bituminous mines were sunk and placed in operation during the fiscal year. There were four bituminous mines in process of sinking. These will be equipped with the latest mining machinery and will be large producers. Several smaller mines are also under construction in the vicinity of towns and cities to take care of the local trade.

*Mine inspector, Room No. 32, State Capitol, Indianapolis, Ind.

Seven bituminous mines and two block-coal mines were abandoned during the fiscal year.

The general condition of the coal trade showed a marked improvement over the same period of the previous year. From Oct. 1, 1915, to Mar. 31, 1916, there was a good demand for coal, but the market for free coal did not run far above the prices at which the coal was contracted, though a considerable quantity of fuel was stored in January, February and March, anticipating a possible suspension of work on Apr. 1, 1916, at which time the contract with the miners expired. This did not stimulate the prices to any extent, as there was plenty of coal on the market, with no car shortage at that time.

According to my observations under the new contract, prices on the mine-run basis ranged from $1.15 to $1.30, or about 10c. higher than last year, while prices for free coal fluctuated so rapidly during the last three months, caused by the car shortage and speculation, that it is a hard matter to strike an average of the prices for free coal at the mine. It is known, however, that bituminous and block coal have brought $3 per ton, with speculators asking even a higher price. Conditions as to car shortage have been somewhat better recently and the situation has eased off somewhat.

Fatalities

There were 48 fatal accidents during the year. The number of tons produced per fatality was 379,963. While the loss of life during the fiscal year is greatly to be deplored, still it is encouraging to note that there were six fatal accidents less than in 1915, with an increased production of 2,541,335 tons, or approximately 96,000 more tons of coal mined for each fatality than in 1915. There was an average of 22,000 persons employed in and about the mines, which would be 2.18 killed per thousand employed.

With the Workmen's Compensation Act in force, additional safeguards are being recommended and these recommendations are being complied with by some mine managers, especially by coal companies carrying their own risk under the law. The first-aid movement has been doing good work and miners are being trained to care for the injured. The mining department wishes to thank the miners for their coöperation in the work of life conservation.

Having records of how accidents are occurring in the mines, it is hoped that the Legislature of 1917 will pass some mining laws that will remove the causes and prevent the recurrence of some of these accidents. All persons employed in and about the mines should interest themselves in this movement, as it takes team work as well as individual effort to reduce accidents in coal mines.

Iowa

By L. E. Stamm*

The conditions in the Iowa coal-mining industry for the calendar year 1916 will show but little change over that of 1915. In the early part of the year 1916 good business in the production of coal prevailed in anticipation of a suspension in the industry after Mar. 31, while the new wage scale was being perfected and adopted. Considerable coal was stored by the railroads and the larger manufacturing companies in January, February and March. As a consequence of this the demand for coal was light during the months of April, May and June, and while there was no suspension in mining as was anticipated by some, the demand was so slight that mining operations were almost at a standstill. The months following showed a fair demand for coal, which demand increased during the remainder of the year, October, November and December proving the best months in the Iowa coal industry for years.

No statistics are available as to the output of the mines for 1916, the number of miners employed, etc., as the mining companies will not report to the mine inspectors' office before Feb. 1. However, because of the severe competition the industry has suffered in the last few years, chiefly from coal shipped in from nearby states, the production has remained almost the same from year to year, the amount of coal produced totaling about 7,500,000 tons per annum.

Statistics for the year 1915 showed a production for that year of 7,530,088 tons of coal, and 16,369 men employed in an around the mines in the state. It is quite possible that the production for 1916 will exceed that of 1915 by a small amount, although no new territory has been developed during the last year and but few new mines opened in already productive territory. It is probable that the statistics for the year will show a slight increase in the number of men employed.

In the agreement made in April, 1916, between the operators and the miners, the State of Iowa was put on a mine-run basis in coal mining. This necessitated a change in the tipples at many of the mines, so that the coal could be screened after weighing instead of before weighing. This change threw some of the mines idle for a short period during the summer, while the change was being made. The production for the year for this reason may have been cut down a little, but probably not in any great amount.

Machine Mining Was a Bone of Contention

Considerable difficulty was experienced by the miners' and the operators' representatives in arriving at a satisfactory agreement with reference to a scale for machine mining. The matter was finally submitted to a special committee of miners and operators with instructions for them to submit the same to arbitration in case they were unable to arrive at a satisfactory conclusion, and with the understanding that the miners and the operators as a body would accept the decision of the special committee, or in case it went to an arbitration committee to accept their decision as final.

The new agreement between the operators and the miners is entered into for a period of two years from Apr. 1, 1916, and it is quite likely that no special difficulties will occur in that time to interfere with the continued production of coal.

While mining conditions in the state generally were exceptionally good during the last three months of the year, prior to that time the southern Iowa coal field suffered in the Southwest trade by reason of Illinois shippers being granted a 25c. better rate to Kansas City points. I have not yet learned whether the same conditions now prevail, but in the early fall months it meant a considerable loss to the coal operators in the southern part of Iowa.

*Secretary, Iowa Mine Inspectors, Des Moines, Iowa.

First-aid work continues to have a place in the coal industry of this state. The United States Bureau of Mines' representative was in the state early in the year organizing first-aid teams. Much interest was manifested and a number of teams organized, and since then some field contests have been held. The camps are well organized at the present time and it is hoped that the work will continue until there are a number of well-drilled rescue teams in the state.

At the present time 250 mines are being operated in the State of Iowa. A number of these are small mines that operate only during the fall and winter months for local trade. More than 16,000 men are given employment in the operation of these mines. Many of the larger mines of the state are equipped with electric hoist and electric haulage and of recent years quite a number of electric mining machines have been installed.

Prices for coal in some parts of the state have increased. This refers to prices to the consumer where coal has been delivered. The price prior to the new agreement in May was $3.75 per ton for Iowa coal delivered in Des Moines by the companies operating mines within or close to the city. This price was advanced immediately after the agreement to $4 and on Nov. 1, when a shortage of cars cut down shipments of Illinois and Kentucky coal to local dealers here, Iowa coal in Des Moines took a jump to $4.50 per ton. It is hard to say at the present time whether this price will maintain. Railroad mines are not receiving a price for coal commensurate with the increased cost of all kinds of mine supplies. In fact many companies find that the present prices paid by the railroads means work at the mines but no profit to the operator, due to the increased cost of materials. High prices for mine supplies have come since the contracts with the railroads were entered into.

As to labor troubles, it is hardly likely that the production for the year will be interrupted in this way. Labor troubles in Iowa usually confine themselves to terms of the agreement and in former times these have been settled while the men remained at work.

I expect that final figures will show a production of coal better than 7,500,000 tons, with employment given to more than 16,000 men in and around the mines.

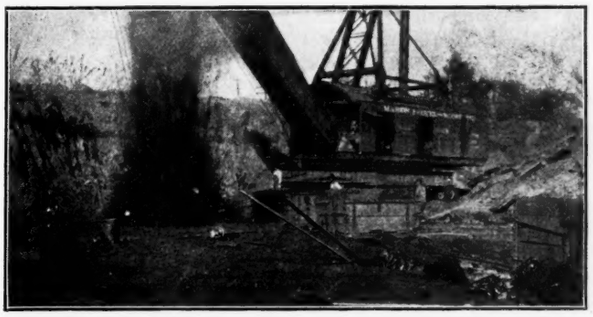
Kansas

By John Pellegrino*

It is impossible at the present time to give accurate figures of the coal production of the State of Kansas, but the output is estimated to be nearly 8,000,000 tons, thus making the greatest amount of coal ever produced in this state in one year.

The deep mines in Crawford and Cherokee Counties produced about 80 per cent. of the entire coal production of the state. All the mines in these two counties are worked on the room-and-pillar system and the coal bed will not average 3 ft. in height, while considerable faulty work is encountered. Nevertheless, there are mines in this field that produce from 1000 to 1200 tons of coal per 8-hr. day. Mine No. 45 of the Central Coal and Coke Co. produced 171,691 tons of coal and worked 169⅜ days from Jan. 1 to Dec. 7, 1916. During the month of April this mine was shut down for repairs.

*State mine inspector, Pittsburg, Kan.



SHOTFIRING IN STRIP PIT OF PATTON COAL CO., NEAR FRONTENAC

The coal mines in Leavenworth, Osage and Linn Counties are small. The coal runs from 12 to 30 in. in height and is worked on the longwall system of mining.

At present about 13,000 men are employed in the coal mines of Kansas, and from Jan. 1, 1916, to the present writing 50 fatal accidents occurred. The number and causes of each were as follows: Explosion at mine No. 9 of the Fidelity Coal and Mining Co., 20 men; falls of rock, 18; shotfiring, 6; premature blast, 2; electrocution, 1; falling down shaft, 1; crushed by cage, 1; by tram-car in strip mine, 1. A great number of fatal accidents occur to the shotfirers in Crawford and Cherokee Counties, but the new mines being sunk in this field are apparently being equipped with a mechanical device that fires the shots from the surface, making it unnecessary for anyone to be in the mine while the shots are being fired. This system will eliminate the accidents to the shotfirers in all mines equipped with these devices. The number of fatalities by falls of rock was greatly increased over that of last year, and a majority of these were unavoidable.

The nonfatal accidents in the mines reported to this department increased considerably over the previous year, but this is accounted for by the operators reporting all accidents to this department, no matter how trivial.

On Dec. 13, 1916, at about 12:10 p.m., a deplorable disaster occurred in mine No. 9 of the Fidelity Coal and Mining Co., located at Stone City, Kan., in which 20 men lost their lives. This was the second largest disaster in the history of the coal-mining industry in Kansas. On Nov. 9, 1888, an explosion occurred at mine No. 2 of the Cherokee & Pittsburg Coal and Mining Co. in which 44 men were killed.

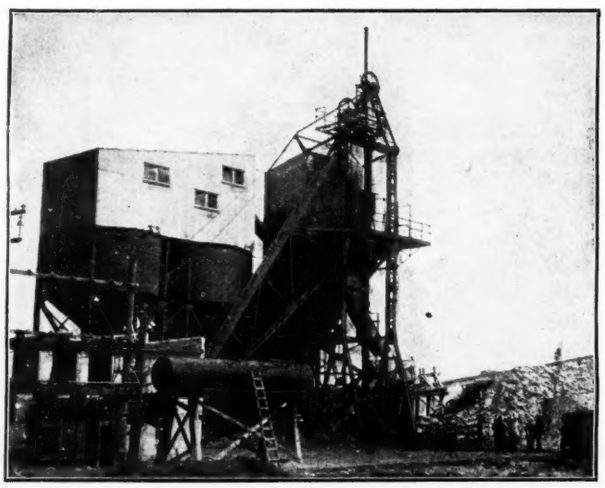
Twelve new mines were opened during the past year; namely, mines Nos. 17 and 18 of the Clemens Coal Co., one located at Cherokee and one 4 mi. west of Pittsburg; mines Nos. 50 and 51 of the Central Coal and Coke Co.; Broadhurst & Coughnour mine, located 3½ mi. southwest of Pittsburg; mine No. 16 of the Jackson & Walker Coal and Mining Co., located 2½ mi. northwest of Frontenac; mine No. 11 of the Frontenac Coal Co., located west of Frontenac; mine No. 1 of the Dopking & Wachter Coal Co., located 1½ mi. northwest of Frontenac; Jones & Davis mine, located 1 mi. west of Frontenac; Domestic Coal Co. mine, located 4 mi. north of Mulberry; Young Coal Co., mine No. 1, located 1 mi. west of Weir; mine H of the George K. Mackie Fuel Co., located 1¼ mi. east of Cherokee.

The conditions of the coal market of the state are unusually bright, but it is impossible to supply the coal market at the present time on account of a shortage of

cars or flats. Some of the mines have only been working half time during the past 60 days on account of being unable to get sufficient flats to run them.

At the present time there are 22 steam shovels at work stripping coal in the State of Kansas and several new shovels are being put in. The dippers on the steam shovels in this state have a capacity of from 2½ to 9 cu.yd., and an over-burden of from 7 to 38 ft. is being stripped. The bed of coal being thus worked ranges from 2 ft. to 3 ft. 10 in. in thickness and is of good quality. About the same number of steam shovels are located on the Missouri side of the state line, and the coal produced in those strip pits is sold in the Kansas market, taking the place of coal that was formerly produced in the State of Kansas. The production of the steam shovel strip pits in Kansas will reach about one million tons for 1916.

Some labor disturbances occurred in this state during the year. The district officials of the United Mine Workers of America called a strike at all the Western Coal and Mining Co.'s and Weir Coal Co.'s mines.



MINE NO. 2, KATY COAL CO., RADLEY, KAN.

This was settled satisfactorily after the men were on strike a short time. There were a number of small strikes at several mines, but these were of short duration and were quickly settled.

Considerable agitation is going on at the present time for the establishment of a mine-rescue station in Pittsburg.

Car No. 4 of the United States Bureau of Mines is stationed at Pittsburg, with J. J. Forbes, Jr., mining engineer, in charge, and Joseph Davies his assistant. First-aid and mine-rescue work is progressing rapidly. The operators and miners are giving their hearty coöperation in this humanitarian movement, and during the past three months 100 miners completed the United States Bureau of Mines course of instruction in mine-rescue work, while during the same period 150 miners completed the regulation course in first-aid work. Mr. Davies has been detailed for training work in Iowa and Mr. Forbes has had full charge in this field and has done the training. He also has been actively engaged in organizing volunteer rescue squads in Crawford County to respond to disaster calls. First-aid societies have been organized in almost every mining town and coal camp in the State of Kansas, during the past two and three years.

Kentucky

By C. J. Norwood*

The estimated tonnage of coal produced in Kentucky for the year 1916 is approximately 25,106,500 tons. The western portion of the state contributed 7,524,400 tons, Christian, Daviess, Henderson, Hopkins, Ohio, Union and Webster Counties being included in this section. These figures indicate a loss of 61,000 from the preceding year, due to the strike in Muhlenberg and Ohio Counties.

The southeastern section contributed 6,763,300 tons, including Bell, Harlan, Knox, Laurel, McCreary and Whitely Counties. This tonnage indicates a gain of more than 600,000 over the 1915 production, which is less than would have been produced had there been no car or labor shortage.

The northeastern part of the state produced 10,818,800 tons, from the following counties: Boyd, Breathitt, Carter, Floyd, Jackson, Johnson, Lawrence, Letcher, Morgan, Perry and Pike. The gain from these counties was nearly 3,300,000 tons over the preceding year.

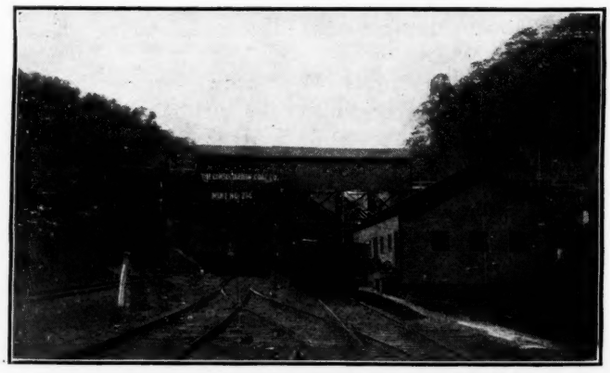
The 1916 output of Kentucky exceeded that of 1915 by approximately 4,000,000 tons, despite labor and car shortage. The labor shortage was not serious, although one company figures its production was curtailed 250,000 tons on this account, and 60,000 tons due to car shortage.

Shipments from the western part of the state went almost exclusively to Southern markets, but a comparatively good tonnage went to southern Indiana and Illinois. Similar shipments from the southeastern district went principally to Tennessee, Georgia, North and South Carolina, but a notable headway was made in shipments north of the Ohio River to the West and Northwest. A relatively small percentage of the production of the northeastern district went to Kentucky points, the shipments going chiefly to Ohio, Michigan, Indiana, Illinois and the Northwest, some also going to Canada. Quite a considerable tonnage went to byproduct ovens in Kentucky, Michigan, Wisconsin and Illinois, and some shipments were made to Tidewater.

The car shortage that affected all districts became serious about the latter part of August, but began to improve about the middle of November, although it is still felt and may reduce the estimated tonnage for December.

The curtailment of the output of individual companies from August to November inclusive ranges from 20 to 60 per cent. From the reports received it is probable that with an adequate car supply, which would also have

*Chief state mine inspector, Lexington, Ky.



CONSOLIDATION COAL CO.'S TIPPLE AT McROBERTS, KY.

helped the labor situation, at least from 2,000,000 to 2,500,000 tons would have been added to the output of the state.

One strike or suspension of serious consequence occurred that involved practically all the mines in Ohio and Muhlenberg Counties, which are the union strongholds. It lasted from May 15 to Aug. 12 and arose through a disagreement over the wage scale proposed at the April convention of the miners and the operators. The strike was settled by acceptance of the operators' terms. The net effect of the strike on the year's tonnage in Ohio and Muhlenberg Counties was less than was expected, the estimated tonnage, however, as stated above, showing a decrease.

What appears to have been a curious strike occurred at the mines of the Continental Coal Corporation in Bell County the latter part of May, affecting six mines and lasting 10 to 18 days at the different mines. It is said there were no demands and no settlement, the men simply quitting and then returning to work. It is understood, however, that questions of unionizing the mines entered, but the company, it is said, still does not recognize committees as union committees.

Maryland

By John L. Casey*

The estimated amount of coal produced in Maryland during 1916 was 4,930,000 tons.

The following tables show the number and classification of men employed, the number of fatalities and their causes.

NUMBER AND CLASSIFICATION OF EMPLOYEES

Number of men employed underground	4,443
Number of men employed on surface	809
Foremen and clerical forces	200
Total	5,452

FATALITIES

Cause	Number Killed
Dust explosions	16
Handling explosives	2
Falls of rock	8
Falls of drawslate	1
Falls of bone coal	1
Falls of rash	1
Falls of breast coal	1
Kicked by mule	1
Total	31

The various seams of coal worked during the year were as follows: The Pittsburgh, or Big Vein; the Sewickley, or Tyson; the Lower Kittanning, or Davis, 6-ft.; the Bakertown, or Barton, 4-ft.; the Upper Freeport, or Thomas, 3-ft.; the Waynesburg; the Clarion, or Parker; the Brookville, or Bluebaugh, and the Little Pittsburgh.

During the year five new companies were organized and began shipping coal.

In Alleghany County 31 companies operated 70 mines; in Garrett County 10 companies operated 15 mines. Thus in the state 41 companies operated 85 mines in two counties.

Michigan

By Thomas Kanary†

The estimated production of Michigan coal this year is about the same as last year—1,056,393 tons. There are 16 mines in operation at the present time, with three new mines being sunk. These new shafts will tap large basins of coal and it is expected employment will be given to a large number of men.

There is no scarcity of labor in the mines just now, but during the summer months the industry was badly handicapped on this account. The railroad car service was about 95 per cent.

There were 191 accidents reported for the past year up to the latter part of December, two of which proved fatal.

The mines are in good condition, and the indications point to a good winter with a very fair price for coal.

Missouri

By J. P. Hawkins*

There are no means available at the present time for accurately calculating the coal production of Missouri. It will be observed, however, from the following table, which shows the coal production of the state for 1891 and subsequent years, that the output never fluctuates violently from year to year. It is estimated, conservatively, that in 1916 the state produced somewhat over 4,000,000 tons of coal.

COAL PRODUCED IN MISSOURI

Year	Tonnage	Year	Tonnage
1891	2,650,018	1904	4,241,912
1892	3,017,283	1905	4,381,956
1893	3,190,442	1906	3,889,659
1894	2,383,322	1907	4,355,494
1895	2,283,081	1908	3,400,644
1896	2,420,147	1909	3,850,748
1897	2,429,388	1910	2,809,215
1898	2,838,152	1911	3,521,988
1899	3,191,811	1912	4,229,907
1900	No record	1913	4,010,236
1901	No record	1914	3,840,455
1902	No record	1915	3,744,594
1903	4,265,328	1916	*4,000,000

* Estimated.

Montana

By John Sanderson†

There has been a marked improvement in the demand for coal during the year 1916, over that for 1915. This was partly due to the severe winter of 1915-16, and also to the fact that the railroads of the state are operating to their full capacity. Being large consumers of coal, they are not contributing to the commercial market at the present time, they being barely able to get a sufficient supply of coal for their own requirements.

For the year ending Oct. 31, 1916, there has been more coal produced in Montana than in any previous year in the history of the state, the year 1913 being the nearest competitor, with a production of 3,365,712 tons. This year the output of coal was 3,688,307 tons, an increase over 1915 of 1,000,000 tons. This is remarkable when it is taken into consideration that all the industries in the state are adopting the use of electricity, the Chicago, Milwaukee & St. Paul Railroad Co. alone having electrified a unit of 440 miles, all of which is in operation at the present time with the exception of about 34 miles at the western end.

At the present time there is a large demand for coal that the commercial mines can not meet. This is mainly due to a scarcity of railroad cars, which has been felt

*State mine inspector, Frostburg, Md.
†State inspector of coal mines, St. Charles, Mich.

*Secretary, Bureau of Mines and Mine Inspection, City of Jefferson, Mo.
†State mine inspector, Helena, Mont.

for the last three months but which at the present time has been relieved to some extent.

Most of the coal operators of the state have advanced the price of coal at the mine from $3.50 to $4 per ton, and the demand is in excess of the supply. Coal is selling in Helena at $8 per ton, with the prospect of the price going higher.

There seems to be an idea prevailing in the State of Montana that coal is on its last legs and that electrical energy will displace it, but if the production of coal for the year 1916 is anything to judge by, the future prospect of the coal industry of Montana appears to be bright.

The following table gives a résumé of Montana's coal production for the fiscal year ended Oct. 31, 1916:

Number of mines reporting to state inspector	59
Machine men and helpers	199
Loaders	936
Pick miners	1,252
Inside daymen	864
Outside daymen	583
Total number of men employed	3,834
Tons per man per day	4.2
Total tonnage	3,688,307
Total value	$5,899,355
Total number lives lost	19
Total number seriously injured	59
Tons produced per life lost	194,121
Tons produced per serious accident	62,514
Number of men employed per fatal accident	202
Number of men employed per nonfatal accident	65
Men killed per 1,000 men employed	4.9
Men seriously injured per 1,000 men employed	15
Kegs of powder used	64,372
Tons of coal machine mined	1,887,116
Tons of coal hand mined	1,801,191
Per cent. of coal machine mined	51
Per cent. of coal hand mined	49

New Mexico

By W. W. Risdon*

In this review of the production of coal and coke the figures given are for the fiscal year beginning Nov. 1, 1915, and ending Nov. 1, 1916. The review contains statistics gathered from the reports made to the mine inspector's office by the operators of 42 mines. Several of the operators who have produced an appreciable tonnage during the period covered failed to make any report of their operations. Therefore the total production of coal and the number of men employed is greater than the figures given in this statement.

The total production of coal for the year amounted to 3,893,185 short tons. This is a slight increase over the production for the preceding year. Of this production 53,445 tons was anthracite, 3,084,478 tons bituminous, and 755,262 tons semibituminous. The approximate value at the mines is given as $5,694,807.

During the year 2,897,822 tons was sold on the market, 965,042 tons was made into coke and 30,321 tons was used in operating the mines.

The average number of miners employed for the year was 2500; daymen, 715; boys employed in the mines, 45; total number of employees underground for the year, 3260. The average number of outside men employed for the year was 753; boys employed outside, 57; total number of employees outside the mines, 810. The total number of employees in and about the mines for the year was 4070.

The average number of days worked during the year for the 42 mines included in this review was 235½.

A great deal of complaint has been heard about the shortage of labor at the mines in New Mexico, but it is doubtful if the shortage has curtailed the output to any appreciable extent. For while some of the small producers claim that they have not been able to fill their orders, the largest producers report loss of time for lack of orders.

Colfax is the only county in the state that produces any coke. The St. Louis, Rocky Mountain & Pacific Coal Co. here operates 410 ovens and produced 193,282 tons of coke. The Stag Canon Fuel Co. operates 570 ovens and produced 285,871 tons of coke. The total tonnage of coke for the year was 479,153 tons, valued at $1,486,878. There were 310 men employed around the coke ovens. The demand for New Mexico coke greatly exceeded the supply.

*State mine inspector, Albuquerque, N. M.

North Dakota

By Jay W. Bliss*

The state engineer's office has not yet received complete data as to the production of the lignite mines of North Dakota for the year ending Dec. 31, 1916. It is estimated, however, that the total production for the year will be not less than 620,000 tons.

One hundred and forty-five mines have been in operation during the past year, employing about 1100 men during the winter months and 700 men during the summer months. The mines have been especially free from labor troubles, and there have been no serious or fatal accidents.

A briquetting plant with a capacity of 100 tons a day is in operation at Minot, while a plant having a similar capacity is being constructed at Scranton.

The market for lignite is constantly growing and prices have been better in the past year than ever before. A number of small mines have been opened during the past year and three of the larger concerns are improving their properties so as to greatly increase their output.

*State engineer, Bismarck, N. D.

Ohio

By James H. Pritchard†

On Aug. 30, 1916, I submitted to the Industrial Commission of Ohio, a report of the activities of the Department of Mines covering the fiscal year from July 1, 1915, to June 30, 1916. This report was supplemented by one filed Jan. 4, 1917, covering the calendar year 1916, and this period is covered in the review following. In the fiscal report submitted, the following recommendation was made:

> The work of the Oil- and Gas-Well Department has increased to such an extent that the coming legislature should be called upon to increase the number of oil- and gas-well inspectors.
>
> Only one inspector is now employed, but four or even six are needed. The inspectors should be present to see that all the needed precautions are taken on the abandonment of oil and gas wells so that the public may be assured that the law is fully complied with. All operators, moreover, are required to make an application in blank form to the Oil- and Gas-Well Department before they commence to drill for oil or gas. The granting of permits for such drilling involves much work. Consequently it is evident that the employment of a larger force even than that specified would be advantageous.
>
> If the recommendation for an enlargement of the staff is carried out, it will relieve the deputy mine inspectors from performing the work of looking after the drilling of oil and gas wells and witnessing the abandonment of them, which duties they now perform, and will permit them to devote

†Chief deputy and safety commissioner of mines, Columbus, Ohio.

their entire time to the more important work of mine inspection.

In recent years the legislature of the state has recognized the fact that the unregulated exploitations of the oil and gas resources of the coal-producing counties of the state have become an alarming menace to the successful development of some of the richest coal fields of Ohio.

Unfortunately before proper regulations became embodied in the statutes the oil and gas had been developed for 40 or 50 years, and the drillings then made are now being encountered. Uncharted wells are frequently broken into as mine development proceeds, and when this happens it is always a source of deep concern.

The failure to provide an adequate force of oil- and gas-well inspectors has much hampered the department in carrying out the intent and purpose of the law and in complying also with the provisions contained in a resolution of the Industrial Commission of Ohio. This document requires that:

> Any person, firm or corporation, before drilling or causing to be drilled, any gas well, oil well, elevator well or any test well, within the limits of any coal-producing county of the State of Ohio, shall first cause to be made an accurate map on a scale of 1 in. to 400 ft., said map to show the location and number of the proposed well or wells. A copy of such map shall be filed with the Industrial Commission of Ohio 10 days before commencing to drill any oil, gas, elevator or test well within the limits of any coal-producing county of the State of Ohio; and any person, firm or corporation that has already drilled or caused to be drilled or has possession of any gas, oil, elevator or test well within the limits of any coal-producing county of the State of Ohio, shall be required to file with the Industrial Commission of Ohio a map on a scale of 1 in. to 400 ft., said map to show the location and number of wells drilled. Such map shall be filed with the Industrial Commission of Ohio within 30 days after the passage of this resolution. The chief deputy and safety commissioner of the Department of Inspection, Division of Mines, is instructed and authorized to carry out these provisions.

Since the passage of the law, drilling activities have been properly regulated and kept under control, but the dangers arising from the activities of oil-well operators for 40 or 50 years prior to the passage of the act still confront the mine operator and his employees.

Orders have been issued by the department from time to time regulating the action of mine managers and workmen so that the mines may be safeguarded against sudden contact with uncharted and unplugged oil and gas wells.

Other Recommendations

The department also recommends that sufficient funds be provided for transporting the mine-rescue car from one mining district to another, not only for use in meeting emergencies but also to the end that the inspectors may secure a more thorough and complete system of training and that an auxiliary volunteer force of mine superintendents, mine foremen and miners may be organized and trained at the various mine centers.

The year just closed has been one of unusual activity throughout all the mining districts of the state. With a few minor exceptions, the coal mines have been worked with remarkable freedom from strikes and disputes. Estimates based upon information obtained from the best available sources in the various districts of the state, indicate that the total tonnage for the year will aggregate between 30,000,000 and 31,000,000 tons or an increase of 8,000,000 tons, which is about 35 per cent. over the production of the preceding year, 1915.

This substantial and gratifying increase, does not fully measure the prosperity that has prevailed in the industry, especially during the latter part of the year. The tonnage of that period might well have equaled, if not exceeded that of 1913 if it had not been for the lack of railway equipment.

In several of the coal-mining districts of the state the usual shortage in the car supply was in evidence at the close of the year 1915. Early in the year 1916 the supply became satisfactory, but the inevitable car shortage appeared later and manifested itself much earlier than usual. It actually interfered with business in June and reached an acute stage about September when it affected the output of every district in the state. It proved an important factor in cutting down the tonnage of what otherwise promised to be the greatest production ever reported in the state. In some districts the supply of cars was only 40 per cent. of the number needed but as a general rule from 60 to 70 per cent. of the car demand was supplied.

In the more important districts of the state this lack of cars was to some extent accompanied by a shortage of men. No reliable information is at hand as to the number of men employed during the year 1916, but there were probably no more men than in 1915, when 41,430 persons were at work, which was 5535 fewer persons than in 1914.

Lake Trade Was Active

During the year 1916 the Lake trade was more than ordinarily active. Had it not been for the car shortage, the tonnage of the year would no doubt have equaled, if not surpassed, that of former years. Many of the Ohio coal operators are taking advantage of the present era of prosperity to extend the markets for Ohio coal in fields heretofore ignored.

The long-continued suspension of the mines located in the counties of Belmont, Harrison and Jefferson continued well into the year 1915, but at last a satisfactory wage-scale agreement was entered into between the operators and representatives of the United Mine Workers at Cleveland, Ohio, May 11, 1915. This remained in force until Apr. 1, 1916. However, the price of coal even after the settlement did not justify the large mines of the district in resuming operations, and many of them were not operating at the close of the year 1915.

In the Hocking district, composed of Athens County and the major portion of Perry County, about 60 per cent. of the mines suspended operation in July, 1915, and remained idle until about June of the following year, the reasons assigned by the operators being their inability to compete with cheaper coal produced in other states and the existence of a discriminating railroad rate against Ohio coal.

This condition of affairs necessarily caused the miners and their families much hardship, which was happily terminated by the resumption of work at a portion of the mines about June, 1916, under the management and direction of the Continental Mining Co., of Toledo, Ohio.

On Mar. 9, 1916, an interstate agreement was made covering prices and conditions of mining in western Pennsylvania, Ohio, Indiana and Illinois for the two years beginning Apr. 1, 1916, and ending Mar. 31, 1918. The Pittsburgh Vein Operators Association of Ohio for their mines in Belmont, Harrison and Jefferson Counties, Ohio, then entered into an agreement with the United Mine Workers of America, the contract becoming effective Apr. 1, 1916, and ending Mar. 31, 1918. At Logan, Ohio, on

Apr. 25, 1916, an agreement was signed for the Hocking Valley district to cover the same period of time.

Due to the causes already enumerated the average production of the mines of the state in 1916 will probably be only about three-fourths of their capacity.

The shortage of labor was no doubt due, in a large measure, to the conditions prevailing during the preceding two years, 1914 and 1915. Long strikes in what is known as the No. 8 field and a suspension of the major portion of the mines in the Hocking Valley during portions of those years had caused large numbers of employees to seek work in other fields. Many of these, no doubt, established themselves in their new homes. Moreover, other men were called by their mother countries to become participants in the European conflict.

The lack of these men had a material effect upon the number of fatal accidents that we were reluctantly compelled to record for the year. The working forces at the mines were able to maintain the tonnage, but not without injury to themselves. As shown by the tables, 108 men were killed, 68 by falls of roof and coal, 25 by mine cars or electric locomotives and 5 by electricity; the remainder were killed by less usual causes.

In coal mining the loaders and machine men, with a few exceptions, are paid on a tonnage rate. At most mines the cars available are distributed as far as possible, equally among the loaders. In a mine fully equipped with men the number of cars is limited, so that each loader receives a sufficient number to furnish him with a reasonable day's work.

Less Loaders, Less Care

As the loaders decrease in number, it follows that those remaining receive a larger number of cars than formerly—thus an opportunity is afforded them to increase their earning capacity. In their eagerness to grasp the opportunity for increasing their earnings, they exercise less caution than when cars are scarce, and they take more desperate risks. Instructions and warnings are ignored, and instead of setting a post or taking down a piece of loose slate, the all-absorbing question with them is to get the car loaded. They feel they can attend to those necessary precautions afterward. The result of their mistaken judgment is the ghastly tale told in the table of fatal accidents. To the evil effects of excessive hurry must be added the risks due to a false feeling of security and a contempt of danger which constant association with the dangers of the mine usually breeds. These causes explain at least 75 per cent. of all the fatal accidents in the State of Ohio.

An additional cause of danger arises from the endeavor of mine managers to maintain 100 per cent. production whenever railroad cars furnish an opportunity for operating their mines. This aim they keep in view despite the fact that they may have only 80 per cent. of the force requisite to secure a capacity output. No doubt the ambition to make up for the scarcity of men by the continual speeding up of the fewer men still working contributed to the increase in the number of accidents caused by mine cars and locomotives.

On the whole, however, most of the coal companies have been willing at all times to assist and coöperate with the department in devising ways and means to reduce to a minimum the number of accidents occurring, and many of them have adopted the policy of appointing safety foremen, whose duty it is to patrol the working faces and advise and caution employees against impending dangers, but, so far the results have not been as encouraging as we had hoped for, although basing the experiences of 1916 on that of previous years of equal tonnage, the employment of such agencies has been fully justified and partially rewarded, even if the results do not come up fully to our expectations.

I am persuaded that the accident rate will not be substantially and permanently lessened till the Industrial Commission of Ohio, or some other authority, can clothe with police power mine superintendents, safety foremen and all those who have supervision over employees, so that those inclined to violate laws and instructions can be promptly arrested and punished as the statute provides.

I have on record many cases where men have been particularly cautioned against certain acts, but as soon as the safety foreman or those issuing instructions had retired, the act was committed and fatal results followed.

If those in charge were clothed with power to arrest men who ignore instructions or violate the provisions of the law—and could bring them before the proper authorities for such punishment as is already provided in the mining laws, in my judgment a few examples would be sufficient to promote better discipline among the employees, and create a higher respect for the laws and provisions made for their individual welfare and safety.

Inspectors Do Not Meet the Wrongdoers

Mine inspectors when at the mine rarely come in contact with violators of the law, as every one aims to be on his good behavior while inspectors are around the mine. Their districts are so large, however, and their field of operation is so broad, that only with difficulty, can they visit all of the important mines under their charge within the three months provided by law.

While the remedy here suggested may be considered by some to be too drastic, the subject with which it has to deal is too serious to be quibbled over. The remedy would be fully justified if it would only accomplish the purpose sought. The powers conferred should be used with equal severity against employees, mine managers and all agents of the company neglecting to perform faithfully all the obligations and duties placed upon them by the mining laws of the state.

On Oct. 10, 1916, the following Bulletin B-4 regulating the examination of mines by firebosses was issued:

To all coal companies and individuals within this state operating mines generating firedamp:

Recent investigations by this department have disclosed the fact that many, if not all, firebosses when making their investigations before working time in the morning are in the habit of carrying an open light in addition to the standard safety lamp, the argument being that such a light is necessary in making the proper examination of the traveling ways and in inspecting the approaches to old workings, as sections 925 and 955 of the Ohio Mining Laws require firebosses to do.

It is conceded that the standard safety lamp does not furnish as much illumination as may be needed in making the proper investigations of the roof, timbers and the elements of safety in traveling ways, and particularly in old workings, yet the use of open lights as now practiced has been a fruitful source of mine accidents, some of which have been fatal, and a large number serious in their character.

Dating from Nov. 1, this department in an effort to remove this source of serious and unnecessary danger will require that all firebosses shall be permitted to use only safety lamps of an approved type when investigating the working places of the mine in the time specified by the law. In addition when safety lamps will not suffice, the examination of roadways, traveling ways and approaches to old workings and the old workings themselves must be examined with approved

electric lamps. In our judgment their work can then be accomplished more efficiently than at present and the danger attendant upon the use of open lights will thereby be avoided.

Indications point to a successful and properous period of activity throughout the coal industry of the state for the year 1917. This success bids fair to be limited only by the ability of the railroads to furnish adequate equipment to keep the mines in steady operation.

FATAL ACCIDENTS IN 1916 BY PERIODS OF LIFE

16 to 20 years	11
20 to 30 years	36
30 to 40 years	31
40 to 50 years	13
50 to 60 years	14
60 to 70 years	2
80 to 90 years	1
Total	108

FATAL ACCIDENTS IN THE STATE OF OHIO, JANUARY 1, 1916, TO DECEMBER 31, 1916, INCLUSIVE

Counties	Falls of Roof	Falls of Coal	Mine Cars	Electric Locomotives	Electricity	Explosions of Powder	Railroad Cars	Shot Through Rib	Caught by Cage	Mining Machines	Explosions of Gas	Total
Athens	6	2	2	..	..	2	..	..	..	..	..	10
Belmont	18	..	7	2	2	2	1	1	..	..	..	33
Carroll	2	..	1	..	..	..	..	..	..	1	..	4
Guernsey	6	..	4	1	1	..	..	..	..	..	1	13
Harrison	3	..	..	..	..	..	..	1	..	..	..	4
Hocking	2	..	..	..	..	..	..	..	..	..	..	2
Jackson	4	..	..	..	..	..	..	..	1	..	..	5
Jefferson	7	1	2	2	1	..	1	..	..	..	..	14
Lawrence	4	..	..	..	..	..	..	..	..	..	..	4
Meigs	6	1	..	..	1	..	..	..	..	..	..	8
Muskingum	1	..	..	..	..	..	..	..	..	..	..	1
Noble	..	1	..	..	..	1	..	..	..	..	..	2
Perry	1	..	1	..	..	..	..	..	..	..	..	2
Tuscarawas	3	..	2	1	..	..	..	..	..	..	..	6
Total	63	5	19	6	5	3	2	2	1	1	1	108

Oklahoma

By Edward Boyle*

In the year ended June 30, 1916, 3,053,543 tons of coal was produced from the mines of Oklahoma. This is a decrease in the production from the previous year of 268,252 tons. In 1915 there was also a falling off of 410,757 tons. Of the 1916 production, 1,957,722 tons was obtained by pick mining, while 1,058,320 tons was obtained from machine mines. This is an increase of machine-mined coal of 287,566 tons.

The subdivided production of the various grades of coal marketed follows. This production is classified by districts, and also by whether the coal was obtained by machine or pick mining.

PICK-MINED COAL

District	Lump	Nut	Pea and Slack	Run-of-Mine	Total
No. 1	87,136	10,602	61,549	799,400	958,687
No. 2	225,167	57,319	173,273	258,308	714,067
No. 3	76,607	6,580	17,788	243,993	284,968
Total	328,910	74,501	252,610	1,301,701	1,957,722

MACHINE-MINED COAL

District	Lump	Nut	Pea and Slack	Run-of Mine	Total
No. 1	128,706	9,936	41,357	18,054	198,053
No. 2	43,788	11,901	26,856	187,875	270,420
No. 3	43,221	9,229	40,213	497,184	589,847
Total	215,715	31,066	108,426	703,113	1,058,320

STRIP-MINED COAL

District	Lump	Nut	Pea and Slack	Run-of Mine	Total
No. 1	.....	.....	.....	19,463	19,463
No. 3	7,036	3,480	2,403	5,119	18,038
Total	7,036	3,480	2,403	24,582	37,501

TOTAL PICK-MACHINE- AND STRIP-MINED COAL

Entire state	551,661	109,047	363,439	2,029,396	3,053,543

Reports were received from 98 mines, of which 31 operations report a production of 30,000 or more tons per annum. There are 16 mines with an average daily production of over 300 tons. The largest average daily production is 842 tons and is reported from the Rock Island Coal Co. No 40 mine, located at Gowen, Okla.: While the M. K. & T. Coal Co. No. 19, at Wilburton, follows with a record of 811 tons. A list of mines with a daily production of over 300 tons is given below.

District	Name	A. D. Tonnage	Days Worked	No. Loaders	Class
No. 1	Eastern C. & M. Co., No. 21	335	184	81	Pick
No. 1	Degnan-McConnell, No. 5	442	197	100	Pick
No. 1	Folsom-Morris Coal Co., No. 5	623	197	198	Pick
No. 1	Hailey Ola, No. 4	323	118	66	Pick
No. 1	M. K. & T. Coal Co., No. 19	811	176	155	Pick
No. 1	Rock Island Coal Co., No. 40	842	256	191	Pick
No. 1	Union Coal Co., No. 6	433	117	54	Pick
No. 1	Central C. & L. Co., No. 8	481	237	103	Machine
No. 1	Kali Inla Coal Co.	538	103	14	Machine
No. 2	Milby Dow, No. 9	468	148	106	Pick
No. 2	Rock Island Coal Co., No. 5	507	127	127	Pick
No. 2	Rock Island Coal Co., No. 8	555	24	105	Pick
No. 3	Okla. Con. Coal Co., No. 2	331	39	150	Pick
No. 3	Okla. Con. Coal Co., No. 3	488	137	658	Machine
No. 3	Okla. Con. Coal Co., No. 6	343	93	170	Machine
No. 3	Victoria	509	186	117	Machine

The coal industry gave employment to 10,082 men. Of the total number of miners, 5582 were employed in pick mining and 4500 in mining after machines. As the pick-mined coal amounted to 1,957,722 tons, the average pick miner produced for the year 572 tons. The loading price for pick-mined coal varies from 68c. to $1 per ton, and will average 79c. per ton over all districts. The miner will receive for yardage and other deadwork an additional 30c. per ton, giving him a yearly wage of $622.78. Powder and other expenses will average 14c. per ton, making the miner's net yearly income, $622.78 minus $80.08, or $542.70.

An average of 2206 miners were employed in machine-mining and they produced 1,058,320 tons of coal, or 480 tons per miner for the year. The loading price for this coal varies from 52 to 62½c. per ton, and will average 55c. per ton. Allowing an additional 30c. per ton for yardage and other deadwork, the miner's gross yearly earning will amount to $408. The machine miners' powder and other expenses will average 4½c. per ton, making his yearly expense $21.60 and his net yearly income $386.40.

The report shows that the following explosives were used in coal mining in Oklahoma, divided as indicated, between machine and solid work.

Explosives	Pick Mining	Machine Mining
Black powder	99,709 kegs	10,441 kegs
Dynamite	693 cases	301 cases
Permissible explosives	408,755 lb.	82,870 lb.

Note—Black powder comes in 25-lb. kegs, and is usually FF size. Dynamite comes in 50-lb. cases, 30 to 50 per cent. Permissibles come in 50-lb. cases, about 15 grades.

Nearly 1000 cases of dynamite were used this year, while only 738 were used during 1915. The use of permissible explosives shows an increase of 97,875 lb., the total amount used this year being 491,625 lb. The amount of black powder used has decreased from 142,788 kegs to 110,150 kegs.

The following table shows the nativity and the production produced for each fatal accident as classified.

Nativity	Number
Americans	8
Foreign	11
Total	19

Cause	Number
Explosion of powder house	3
Fall of slate	2
Run over by cars	1
Windy shot	1
Overcome by damp	2
Caught between cars	1
Electricity	1
Fall of coal	2
Premature shot	1
Gas	4
Powder explosion	1
Total	19

For each fatality, there were 160,712 tons of coal produced.

*Chief inspector, McAlester, Okla.

Oregon

By H. M. Parks*

The coal industry of Oregon is confined largely to Coos County, where four different properties are the main producers. The Beaver Hill mine, owned by the Southern Pacific Railway Co. and managed by L. A. Whereat, is a steady producer. This is the best equipped coal mine in the state and is located about 12 miles south of Marshfield. The plant has a capacity of about 150 tons per day, is equipped with an uptodate tipple and has a screening and washing plant that produces three grades of coal for the market—lump, nut and pea. At present this mine employs about 50 men. The Henryville mine, owned by the Smith Powers Logging Co., has recently been leased by R. M. Jennings and associates, of Portland. The mine is situated about six miles southeast of Marshfield and has some good equipment with a present capacity of about 100 tons per day. About 25 men are employed.

The other two producers are the Libby mine, three miles southwest of Marshfield, leased by the Coos Bay Fuel Co. and managed by George Doll, employing about 20 men, and the Riverton Fuel Co. at Riverton, managed by W. S. Hall, employing some 30 men.

All these mines have large reserves of coal, so that production is largely dependent upon the development of the market. Numerous commercial factors have combined to materially reduce the coal output of the Coos Bay region during the past few years, chief of which is the competition with the cheap fuel oils of California. The war time high price of bottoms has a further tendency in this direction, by limiting the tonnage shipped to other Pacific Coast ports.

There is a movement on foot to push a vigorous selling campaign in the Willamette Valley, and it is believed that with the advantage gained from direct railroad transportation with this territory, as well as the advancing prices of competing fuel oils, production can be brought back at least to that of former years.

The coal production from this section in 1915 was 39,231 tons, valued at $111,240, and it is believed that the 1916 production will not exceed this amount.

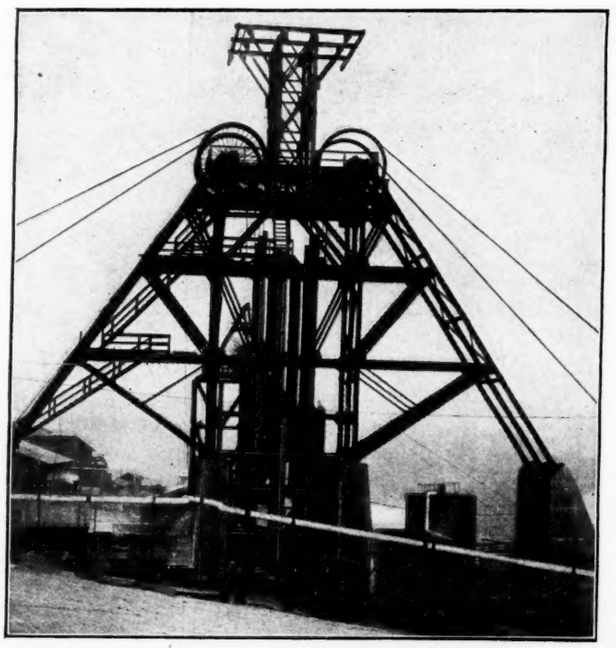
Pennsylvania Anthracite

By E. W. Parker†

The production of anthracite in 1916, as estimated by the Anthracite Bureau of Information shows a slight decrease as compared with the preceding year, but the total quantity sold and delivered to consumers exceeded that of 1915 by more than 10 per cent. These somewhat unusual conditions arose from the fact that the winter of 1914-15 was exceptionally mild and was followed by a period of depression, so that although the production was maintained at practically a normal rate, the market for the greater part of the year refused to absorb it and the surplus was sent to storage yards that were in many cases already well filled.

With the advent of cold weather in November and December of 1915 and the prospect of a suspension of operations on Apr. 1, when the wage agreement of 1912 terminated, demand improved somewhat and some storage coal was sent to market; but as a result of the conditions that prevailed in the earlier months of 1915, the year 1916 opened with an unusual quantity of coal on hand, the amount in storage being variously estimated at from 6,000,000 to 8,000,000 tons. The first three months of 1916 showed an increase in production over the corresponding period in 1915.

In April, however, on account of considerable idleness among the miners, while the wage agreement was in process of adjustment, the output was nearly a quarter of a million tons less than in the same month of 1915. In the four summer months of May, June, July and August the production of 1916 was slightly more (about 250,000 tons) than in 1915, though in neither year was the production or shipments up to normal for that season. During this period in 1916, however, demand for anthracite had been unexpectedly stimulated both by manufacturing industries (due to a shortage of bituminous coal) and by domestic consumers who, warned by the experience of the previous winter which had been in marked contrast to that of 1914-15, had indicated an intention to make their fuel provisions for the coming winter in advance, and at the same time take advantage of the summer discounts.

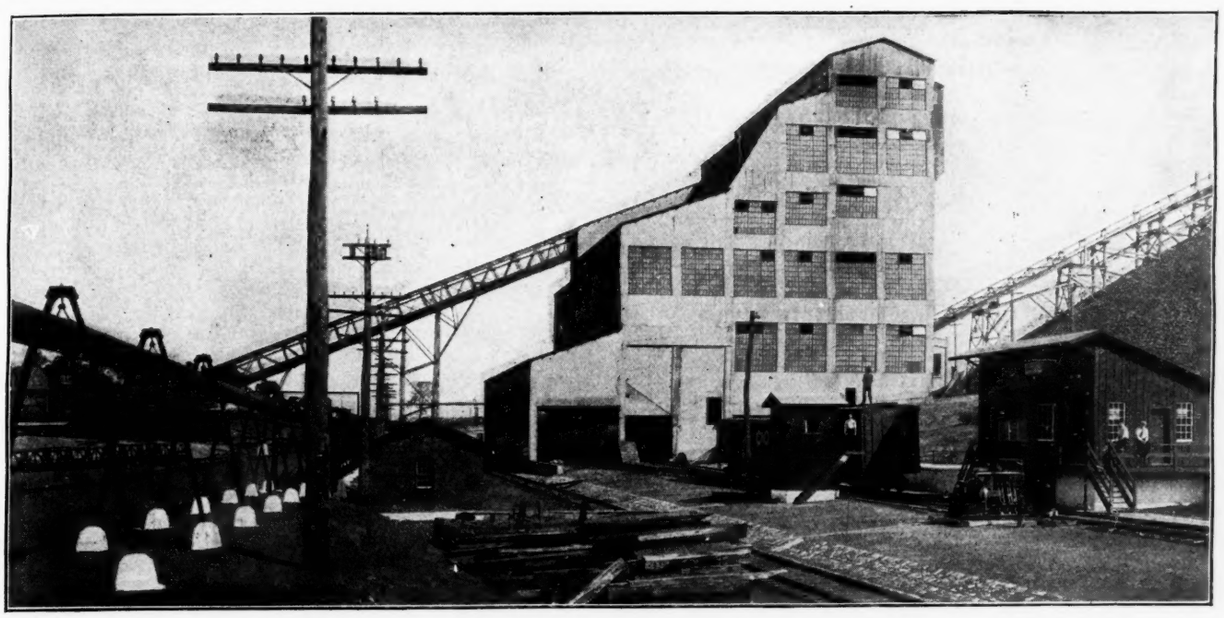


NO. 14 WATER SHAFT, TAMAQUA COLLIERY, LEHIGH COAL AND NAVIGATION CO.

About the same time, as a result of the call for labor from munition plants and other industries, a serious shortage, particularly of miners and miners' helpers, developed in the anthracite region, many operators eventually finding their labor forces depleted by as much as 25 per cent. Production fell off materially in the last few months of the year, the output for that period in 1916 being about 2,000,000 tons less than for the corresponding months in 1915.

The unusual demand, for the reasons stated, absorbed not only the entire production, but the storage yard sup-

*Director, Bureau of Mines and Geology, Corvallis, Ore.
†Director, Anthracite Bureau of Information, Wilkes-Barre, Penn.



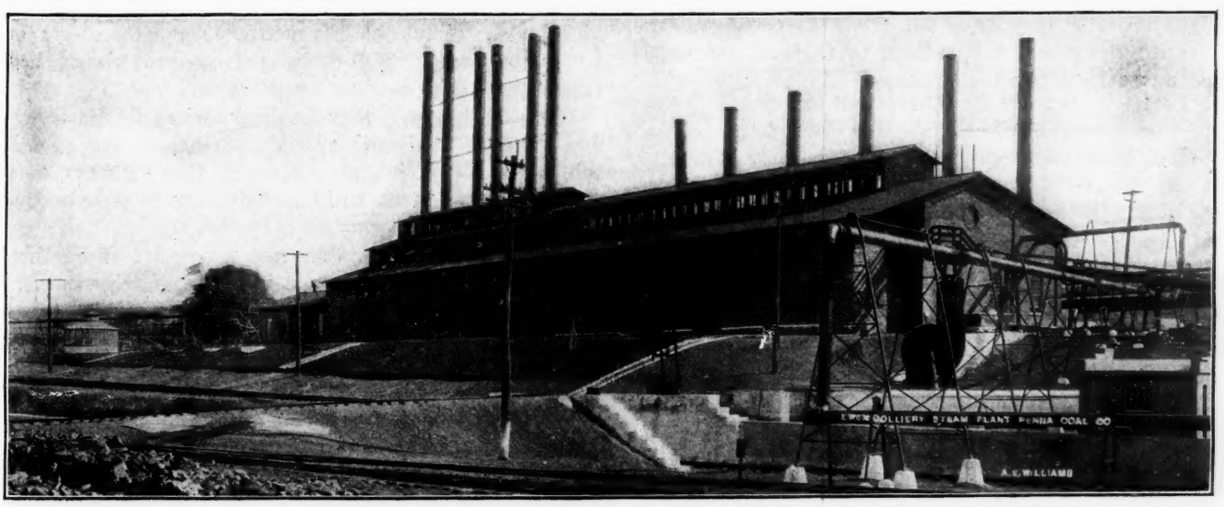
EWEN BREAKER, PENNSYLVANIA COAL CO., PITTSTON, PENN. CAPACITY PER DAY, 2000 TONS

plies, and in November an entirely unnecessary panic, accentuated by sensational newspaper cries of an impending anthracite famine, developed. The fact is that although the production from the mines and washeries in 1916 was about 600,000 tons less than in 1915, this quantity was made up approximately ten times over by the shipments from the storage yards, and the quantity of anthracite actually marketed in 1916 was the largest in the history of the trade. There is also probably more anthracite in the cellars of consumers at present than at any previous time for this season of the year.

Some complaint of car shortage and of inadequate transportation facilities was heard during the panicky period, but as practically all of the coal mined and in the storage yards was sold and distributed, any serious effect upon the industry due to such cause is not apparent.

The total shipments of anthracite for the eleven months from Jan. 1 to Nov. 30, 1916, as compiled by the Anthracite Bureau of Information, amounted to 61,793,617 long tons. On account of the shortage of labor, it is estimated that the shipments for December fell somewhat below what they were in the same month in 1915 and that the quantity sent to market did not exceed 5,800,000 tons, making the total shipments for the year approximately 67,600,000 tons, as against 67,883,776 tons in 1915.

The shipments as reported to the Bureau do not include any of the production of the Bernice Basin in Sullivan County, nor any of the anthracite recovered by dredges from river bottoms. The former approximated 535,000 tons and the latter 115,000 tons. The quantity of anthracite sold locally in 1916 is estimated at 1,800,000 tons, and the colliery consumption at 8,800,000 tons, so that the total production for the year, based on these estimates, amounts to 78,850,000 tons, as against 79,459,876 tons, the total production reported by the United States Geological Survey for 1915. This would indicate that notwithstanding the unfavorable labor conditions, the production in 1916 was only about ¾ per cent. less than that of 1915. The shipments as reported to the Bu-



STEAM PLANT OF THE EWEN COLLIERY, PENNSYLVANIA COAL CO., PITTSTON, PENN.

reau for 1915 and 1916 (those for December, 1916, being estimated) are shown in the following table:

MONTHLY SHIPMENTS OF ANTHRACITE

	1915	1916
January	4,833,599	5,884,350
February	4,349,915	5,696,306
March	5,075,293	6,127,351
April	6,655,625	4,528,784
May	5,954,949	5,547,899
June	5,459,610	5,636,975
July	5,103,665	5,432,878
August	5,462,127	5,531,797
September	5,662,157	5,544,076
October	6,683,007	5,870,204
November	6,494,442	5,992,997
December	6,149,387	5,800,000
	67,883,776	67,593,617

Pennsylvania

By Frank Hall*

The total production of coal in Pennsylvania during 1916 is estimated to have been 246,332,144 net tons, of which 160,774,741 tons were bituminous and 85,557,403 tons anthracite.

The number of employees in the bituminous region was 171,477 and in the anthracite 155,689. There were 418 fatal accidents in the bituminous region and 517 in the anthracite, also 1673 nonfatal accidents in the bituminous region and 1379 in the anthracite. There were no great disasters to mar the remarkable record of the industry.

Great Activity Prevailed

The year was one of feverish activity, sharp contrasts in prices and exasperating uncertainty due to car shortage, labor troubles and embargoes placed upon traffic. To most operators, however, it was a period of almost unprecedented prosperity, the demand for coal reaching abnormal proportions and prices in many cases climbing to high figures.

The European War, with its far-reaching influences, gave a great impetus to nearly all lines of manufacture, and the necessity for large quantities of coal on short notice put a heavy strain on the operators. Those who were properly equipped with mining facilities and were not tied up by previous contracts at moderate prices have had a year of golden opportunity. A word should be said here in commendation of the operators who held fast to the low prices on contracts entered into before the abnormal conditions arose. Many operators faithfully and religiously fulfilled their obligations, although they received probably only $2 a ton, while $4 or $5 was the tempting price held out to them by the over-prosperous and unusually active manufacturers.

Prosperity Is Apparent

When bituminous coal reaches $6.50 a ton at the mine, as was the case in many instances, with a general average of $5, the heyday of prosperity would seem to have been reached for the operators, who, under normal conditions, frequently find it hard to get one-third as much. There has, in fact, been a beseeching appeal for coal from the Atlantic to the Pacific, with prices a secondary consideration.

The anthracite region was also agreeably affected by the great wave of business activity, and the operators reaped rich results. Anthracite in some localities was at a premium several times during the year, with the price in New York at $12 a ton and at other points $10. The following table shows the coal production of the state by districts.

ANTHRACITE

Districts	Production, Gross Tons	Employees	Coal Consumed at Mines, Tons
1	2,792,837	5,911	328,006
2	3,963,226	5,287	340,849
3	2,738,944	5,236	396,733
4	2,482,096	5,061	369,572
5	2,952,709	6,801	250,920
6	3,387,668	7,189	367,174
7	2,840,915	6,550	268,167
8	3,661,433	8,790	370,707
9	2,764,559	6,232	383,737
10	2,574,884	5,673	341,682
11	3,175,390	5,634	541,721
12	3,791,608	7,173	488,506
13	3,547,616	7,345	329,884
14	3,607,757	7,349	325,501
15	4,083,339	6,621	628,321
16	3,059,239	7,529	427,360
17	3,433,465	6,222	318,779
18	2,010,215	3,543	320,846
19	3,000,000	5,000	325,000
20	3,063,451	6,349	445,539
21	2,900,000	5,500	300,000
22	3,499,312	7,712	607,686
23	2,345,000	6,060	349,000
24	2,320,999	5,722	354,412
25	2,393,877	5,200	393,877
Totals	76,390,539	155,689	9,574,179

BITUMINOUS

District	Production, Net Tons	Employees	Coal Consumed at Mines, Tons
1	4,000,000	4,900	86,000
2	7,080,000	6,650	181,000
3	3,285,000	3,500	185,000
4	5,500,000	5,800	183,000
5	7,291,500	6,605	210,000
6	5,040,024	5,379	133,532
7	4,126,050	6,162	149,850
8	6,336,957	6,771	84,399
9	7,000,000	6,250	211,000
10	3,534,095	4,849	247,188
11	8,500,000	7,000	240,000
12	5,568,498	6,524	226,568
13	4,290,000	4,580	90,000
14	3,129,595	4,070	382,084
15	5,436,889	6,156	82,183
16	5,500,000	8,700	750,000
17	4,752,217	5,486	128,548
18	4,500,000	6,900	235,000
19	6,820,000	5,545	138,000
20	4,249,936	4,650	110,000
21	7,258,950	7,740	590,700
22	4,358,200	3,915	207,900
23	7,200,000	7,900	210,000
24	5,655,373	4,472	300,729
25	5,239,220	5,069	110,522
26	4,508,256	4,918	84,900
27	5,250,000	5,250	63,000
28	5,275,798	5,280	175,065
29	4,675,888	4,591	128,047
30	5,412,295	5,865	144,270
Totals	160,774,741	171,477	6,068,485

The coke production may reach 22,000,000 tons and, if so, will establish a new record. This great output was accomplished, too, in spite of labor and car troubles. The trade felt the quickening impulse of the unusual conditions and every effort was made to meet the demand. Prices in the Connellsville region reached an extremely high mark. Spot coke attained $7.50 and foundry spot $8 at the ovens. The early contract prices were less than half these figures.

In the Eastern and New England regions the car shortage at times was acute and a coal famine seemed imminent in New York at one time. The railways were short of cars and took no immediate steps to remedy conditions.

The lack of cars, together with a scarcity of workers, due largely to the call made upon the foreign miners by their home governments, created early in the year a condition that augured ill for the operators in their efforts to meet the unusual demands for coal.

In various sections of Pennsylvania labor troubles added to the anxieties of the operators and rendered more difficult the keeping of contracts. It is probable that the various drawbacks that injected themselves into the operations of the year lessened the production by 3,000,000 tons.

*Deputy Chief, Department of Mines, Harrisburg, Penn.

MONTOUR MINE NO. 4 AT HILL STATION, PENN., ON MONTOUR R.R., OWNED BY PITTSBURGH COAL CO. ENGINE-ROOM BUILDING IN FOREGROUND

South Dakota

By Otto Ellerman*

Lignite coal bids fair to become one of the important minerals produced in South Dakota. While the output at the present time is limited, owing to inadequate transportation facilities, the tonnage for the year 1916 shows an increase. The price obtained for the product is higher than in previous years. The total for the year shows a production of 14,000 tons, most of which finds use as local fuel.

According to Bulletin 627 of the United States Geological Survey, it is estimated that there are 1,096,480,000 tons of minable coal in Perkins and Harding Counties alone. The lignite of this field has a heating value on a dry-air analysis of 8090 to 8839 B.t.u., and upon this basis of heat units the beds must be 2 ft. 10 in. thick to be considered valuable as coal lands. In addition to the two counties mentioned deposits are also found in Meade, Dewey and Ziebach Counties. Of the numerous producers throughout the counties named the Robbins Mining Co., of Isabel, is the only one with railroad facilities. At the present time this company is the largest operator in the state. At this property underground methods of removing the coal have displaced stripping and open-cut work.

During the year the Johnson Fuel Co., of Fairfax, was incorporated. Its operations are confined to the briquetting of the lignites in both South and North Dakota. A single-unit plant with a daily capacity of 75 tons of briquettes is under construction at the Scranton coal mine, Scranton, N. D., and will be in operation during January, 1917. This company also has options on properties throughout the coal area of South Dakota and several plants will be erected in 1917. The briquettes are made from the lignites by Fernholz machines without a binder.

Among the producers in South Dakota may be mentioned the Jones coal mine, Strool; Sexton Bros., Bison; Cave Hills Coal Co., Buffalo; Forrest coal mine, Lodgepole; A. G. Parker, Lodgepole; A. W. Cazer, Coal Springs; John Higgins, Stoneville; John Schuster, Stoneville; Henry Orth, Stoneville; Andy Knutson, Stoneville; Henry Yeaman, Stoneville; Simon Rogers, Daviston, and the Robbins Mining Co., Isabel. As stated in the foregoing the one drawback to a much larger production is the distance of the mines from a railroad.

*State Inspector of Mines, Lead, S. D.

Texas

By B. S. Gentry*

During the year 1916 there were in operation in the State of Texas 18 bituminous and 32 lignite mines. Two bituminous and 3 lignite were abandoned, while 5 new lignite mines were opened.

The approximate total output of the mines of the state was 1,200,000 tons of bituminous coal and 1,100,000 tons of lignite. The coal and lignite business of Texas is still suffering from the competition with natural gas and fuel oil, which governs the output to a great extent. No coke ovens are operated in Texas.

Utah

By J. E. Pettit†

The production of coal in the State of Utah for the fiscal year 1916 was 3,621,935 tons, an increase of 538,259 tons, or 17 per cent., over 1915 and an increase of 332,-

*State inspector of mines, Rockdale, Tex.

†State Coal Mine Inspector, Salt Lake City, Utah.

680 tons over the production for 1913, which was the record coal-producing year for the state until the present year.

The coke production was 424,294 tons, an increase of 66,722 tons, or 18 per cent.; 5460 tons of this amount is in storage.

An average of 3511 men at the mines and 225 men at the coke ovens were employed during the year—a decrease of 308 men compared with 4044 men for 1915.

There were 22 fatal accidents during the year, or 5.88 per thousand men employed. This is an increase of 11 accidents compared with 1915. Thirteen wives were made widows by these fatal accidents and 47 children rendered fatherless. The majority of the children, however, were self-supporting. There were also 37 serious and 202 nonserious accidents reported, making a total of 261.

During the year 162,355 lb. of black powder and 619,943 lb. of giant and permissible powder were used, or 1 lb. of powder for each 4.63 tons of coal mined.

Some slight labor troubles occurred during the month of October and three mines were closed one day each. The miners and daymen asked for an advance per ton of mined coal and also for daywork. A general advance of 6½ per cent. was given them. The majority of the operators gave the advance voluntarily. At a number of the mines the price of coal to dealers has been raised 60c. per ton.

The average working time at seventeen of the largest producing mines for the fiscal year was 214 days.

A serious condition, owing to the shortage of railroad cars, has confronted the coal operators of this state since September. During the month of October the mines worked 54 per cent. of the time, and in November 61 per cent. The working of broken time, owing to the shortage of railroad cars, caused much dissatisfaction among the miners and a number of men secured employment elsewhere. At the present time the mines are working with decreased forces, but they are yet unable to get sufficient railroad cars to keep even the present force working steadily.

The following table shows the distribution of Utah coal and coke.

DISTRIBUTION OF COAL

	Tons
Manufactured into coke	742,418
Shipped to Salt Lake City	384,346
Shipped to railroads	540,364
Shipped to other Utah points	934,290
Shipped to other states	880,429
Used at mines (local sales and fuel)	129,808
Dust wasted	10,280

DISTRIBUTION OF COKE

Shipped to railroad companies	363
Shipped to Utah smelters	215,643
Shipped to other states	202,828
Storage	5,460

Washington

By James Bagley*

The production of coal in 1916 will be greater than that for the previous year. By the reports received, and an estimate for December, this is shown to be about 3,000,000 short tons, as against 2,409,331 short tons in 1915. Although the production in 1916 will be greater than in 1915, it will still be about 500,000 tons short of the normal production over a period of 10 years. During the past three months the coal business has been in a very flourishing condition. Should this prosperity continue, the output will likely return to a normal tonnage. There is an increased demand for Washington coal, due to the general prosperity, disturbances in the Canadian fields that come in competition with Washington fuel and the increased cost of fuel oil.

The coke production for the year will be about 95,000 short tons, as against 88,695 tons in 1915. The coke output has shown a steady increase during the past three years.

No labor troubles of any consequence occurred during the year. An increase of from 3 to 5 per cent. was granted to all those engaged in and about the coal mines, and a contract was signed by the operators and the United Mine Workers of America that will govern conditions for the next two years.

*State inspector of coal mines, 503 Alaska Building, Seattle, Wash.

Northern West Virginia

By H. O. Williamson*

Throughout the year the severe car shortage has been the most important and distressing feature that northern West Virginia coal operators have had to deal with. Car distribution has been about 35 per cent. below allotment, and in spite of the great scarcity of labor it has not been possible to give the men in the region full time.

This, in the face of the increased demand for coal in general and particularly for coal of the character produced in the Fairmont region, has led to severe criticism of the railroads. The production for the year will probably be in the neighborhood of 14,000,000 gross tons, or about 10 per cent. below last year. Had it not been for the car shortage the year's output undoubtedly would have been in excess of any past performance.

Prices have fluctuated greatly and have been almost constantly abnormal. The high prices of spot coal have resulted in the opening of many small mines or country banks (familiarly known as dog holes), in some cases coal being hauled by teams several miles and loaded into railroad cars. Coal for these small mines, together with other cars bought up and held for speculative prices, has further increased the car shortage.

The Lake trade, which is probably the largest single item of the region's business, has not received its full quota of coal, as sufficient cars were not available. Consequently, there is a shortage at the Upper Lake ports. There is little likelihood, however, that this shortage will be severe, although the Northwest may have a bad scare. It is quite possible that some all-rail shipments will be necessary into the Northwest before the Lakes are again open.

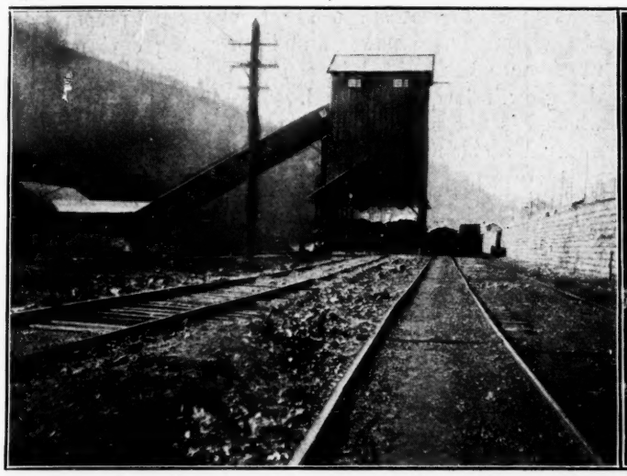
There has been a continued investigation during the year, concerning the use of Fairmont coal in byproduct ovens. The Monongahela Valley Traction Co., which holds large natural-gas interests, has recently purchased the Baxter property of the New Central Coal Co. It is currently reported that its intention is to erect byproduct ovens, using this coal, the gas from which will supplement and finally entirely take the place of its own natural gas.

There have also been transfers during the year, of large acreages of Sewickley coal lands, which were never before active in northern West Virginia, and

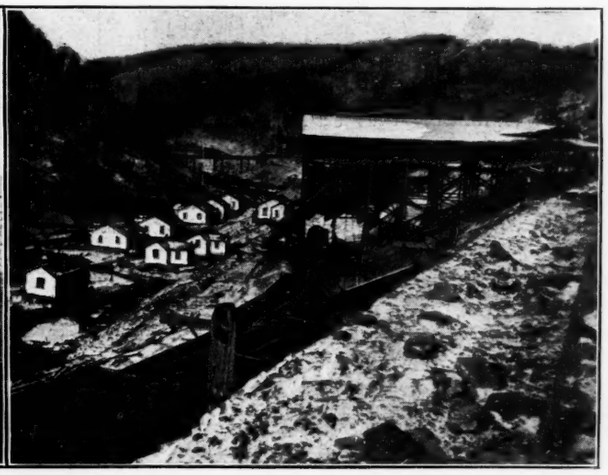
*Consolidation Coal Co., Fairmont, W. Va.

a number of mines have been opened in this seam. Apparently there has been no difficulty in selling this coal in moderately large tonnages whenever cars could be secured. It is reported also that a number of contracts have been made for future delivery.

Developments on the Western Maryland R.R. have been watched with growing interest. Mines Nos. 86 and 87 of the Consolidation Coal Co., on a branch of this railroad, have been in operation for some months and mines of the same company at Wyatt, also on a branch of the Western Maryland, are being completed rapidly.



NEW RIVER POCAHONTAS CONSOLIDATED COAL CO.'S TIPPLE, BERWIND, W. VA.



TIPPLE AND HOUSES OF SLAB FORK COAL CO., SLAB FORK, W. VA.

The friendly relationship that has always existed throughout the region between the workmen and the operators has been further cemented during the year by a substantial, voluntary increase in wages and a consistent and energetic effort on the part of the operators to better both working and living conditions.

Ever since the beginning of the war innumerable persons with very little or no knowledge of the coal business, have been pointing out to the coal operators the immense possibilities of coal business in Europe and South America. In northern West Virginia, at least, it would seem that the operators were thoroughly informed as to the possibilities of this trade, and also of its difficulties. Certainly they have made a strenuous effort and spent a large amount of money endeavoring not only to secure European and South American coal business, but also to put that business on such a basis that it might be retained in future years. During 1915 quite a fair showing was made in spite of the many difficulties encountered. These difficulties have steadily increased throughout 1916 and have left the foreign trade of northern West Virginia in bad shape with little prospect of any immediate improvement.

A demand has been created for the coal of this region in certain foreign markets, but it is now impossible to supply that demand. The shortage of railroad cars has been the first and greatest obstacle. Even were it possible to get cars there are no boats to be had at reasonable rates, and but few at any rate, certainly nothing like an adequate supply. For these two reasons alone there has been case after case where the operator has been simply obliged to refuse foreign orders, although the prices offered have been particularly attractive.

If any one is to be blamed for not taking advantage of the opportunities offered in the way of foreign coal trade, it is certainly not the coal operators of this region. In any event the 1916 European and South American trade of the region will be far less than that of 1915, and at the present moment it is practically at a standstill.

The explosion at the No. 7 mine of the Jamison Coal and Coke Co. at Barrackville, with a loss of 11 lives, marks the only serious accident of the year. Aside from this the accident record shows a gratifying improvement that it is hoped will continue in the future.

The opening of 1917, while it finds northern West Virginia somewhat short of labor, shows general conditions to be excellent. There is little doubt but that if it is possible to arrange for an adequate car supply the year will be a particularly busy and prosperous one.

Southern West Virginia

By Josiah Keely*

The Chesapeake & Ohio and the Norfolk & Western railroads haul most of the coal from what is generally termed southern West Virginia. The local papers give the two together credit for hauling 63,000,000 tons of coal in 1916. The actual record of loading by the New River, Kanawha, Guyan Valley and Kentucky fields along the Chesapeake & Ohio by months is as follows:

MONTHLY LOADING AND CAR SUPPLY ON CHESAPEAKE & OHIO

	Tons Loaded	Car Supplies
January	2,443,200	11.05
February	2,238,050	10.38
March	2,431,520	11.18
April	2,342,980	10.80
May	2,781,575	12.97
June	2,634,665	13.35
July	2,412,085	12.41
August	2,469,930	14.68
September	2,294,970	12.77
October	2,337,375	11.41
November	2,370,130	10.82
December (to the 22nd)	1,754,165	7.57
Total	28,510,645	

These figures are accurate and, when applied to the report of the local papers, would leave 35,000,000 tons for the Norfolk & Western. This is probably not far from correct. The Kentucky field served by the Chesapeake & Ohio produced about 5,000,000 tons and the

*General manager, Cabin Creek Consolidated Coal Co., Kayford, W. Va.

Norfolk & Western hauls some coal from Virginia and Kentucky, but I have omitted the tonnage handled by the Kanawha & Michigan, so a fair estimate of tonnage produced by southern West Virginia for 1916 would be something over fifty million tons and in excess of any previous year.

Glancing at the monthly loading above, it is of some interest to note that while May exceeded all previous records of coal hauling by the Chesapeake & Ohio, yet every month in the year shows over two million tons. Noting the average daily car supplies per month on the Chesapeake & Ohio, it appears that there has been no gradually increasing shortage, but a settled condition of less than 50 per cent. supply for the year.

It is significant that during the months of August and September, when over half a million tons per month were lost on account of the flood on Cabin Creek, Paint Creek, Coal River and other streams, the coal hauled by the Chesapeake & Ohio was just as great as ever, and the car supply correspondingly better to those who were outside of the flooded region.

I feel certain that there is a general impression that the car supply has been becoming increasingly worse, but the actual figures would indicate that it has been uniformly bad all the year. When prices rose, however, the shortage caused an increasingly greater howl both from the producer and the consumer, the former because he was missing a chance to sell coal profitably and the latter because he believed the car shortage was causing the high prices.

The Norfolk & Western has come nearer serving its mines than the Chesapeake & Ohio and has kept up its reputation of being a "coal-hauling trick." The truth is, both of these roads have done a little better than ever before, although there has been some bitter complaint of discrimination in certain sections and there is some suspicion that the roads have yielded to the natural temptation to haul coal from the easiest places instead of making an equal distribution of cars on hand.

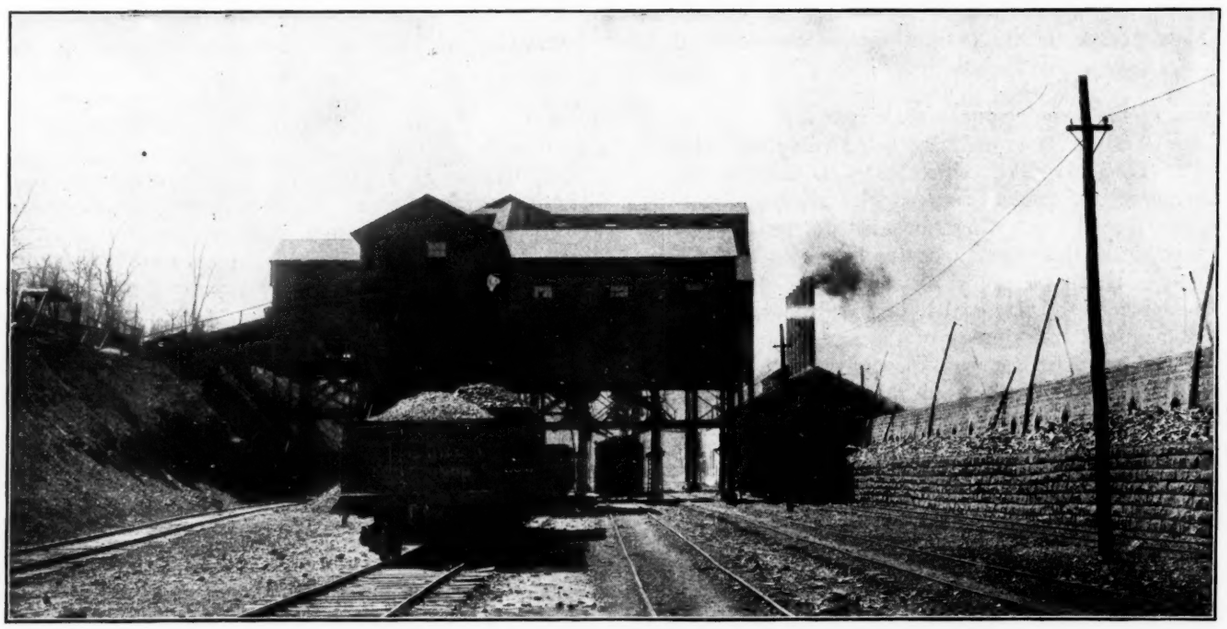
The high price of free coal has caused the opening of many new operations and the reopening of some old ones. It is a source of great discomfort to the older companies that have long standing contracts, that the car shortage will not allow them to sell any free coal. If there were any considerable quantity of free coal to be had, however, its price would soon fall; so, on the whole, the car shortage is more an evil from the standpoint of the consumer than from that of the operator.

During the past year mechanical haulage has been coming into use as well as special screens for the preparation of coal, purchased power and labor-saving devices. No renaissance has started in southern West Virginia, but the growth is quite normal. The year, which on the whole has not been a bad one, has passed without any unusual accidents.

West Virginia

By Earl A. Henry*

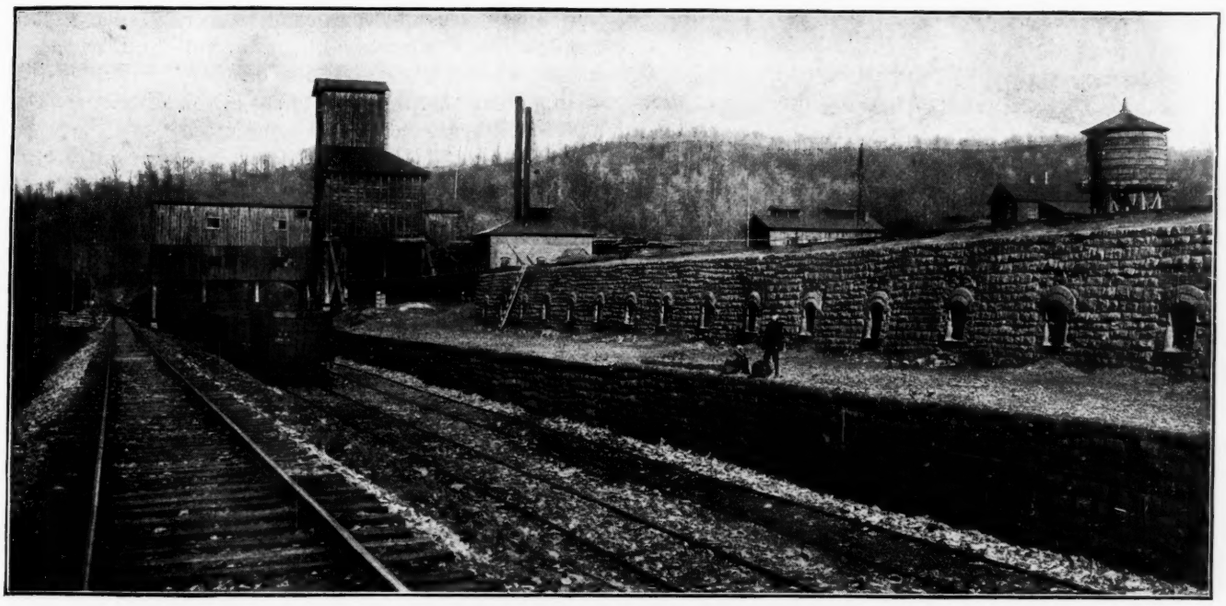
During the fiscal year ending June 30, 1916, there was produced in West Virginia 79,443,768 gross tons of coal and 1,957,632 net tons of coke. During the same period last year there was produced in this state 64,118,677 gross tons of coal and 1,103,004 net tons of coke. This shows that the production of coal this year has increased 15,325,091 gross tons over the production of 1915, while the production of coke rose 854,628 net tons over that of last year.



TIPPLE OF DAVIS COLLIERY CO., COALTON, W. VA.

Of the coal produced this year 74,168,490 gross tons was shipped from the mines, 1,074,446 gross tons was used in the operation of the mines, 975,509 gross tons was furnished to local trade and tenants and 2,925,323 gross tons was used for the manufacture of coke. Small country mines produced 300,000 gross tons. This should be added to the amount furnished to local trade and tenants.

*Chief of the Department of Mines, Charleston, W. Va.



TIPPLE AND COKE OVENS AT JUNIOR, W. VA.

Of the 79,443,768 gross tons of coal produced this year 48,935,403 gross tons was produced by machine mining and 30,508,365 gross tons by pick mining.

During this same period 28,190 machine miners and helpers and 17,780 pick miners were employed, together with 2606 mining machines. Last year there was employed in this state 29,690 machine miners and helpers, and 19,777 pick miners, using 2566 mining machines.

During the year ending June 30, 1916, four counties within the state increased their production by more than 1,000,000 gross tons—McDowell, 5,991,405; Fayette, 2,485,633; Logan, 1,855,104, and Raleigh, 1,141,952.

A number of new developments have been started in Logan, Wyoming, Boone, Marion and Raleigh counties.

Accidents

During the year in question 399 fatal accidents occurred at the mines—370 inside and 29 outside—the principal causes of which were as follows: 224 due to fall of slate, coal and roof; 39 due to electrical motors, mining machines and electricity; 68 due to mine cars; 38 due to local explosions; the other 30 were due to various causes incidental to mining, such as mine cages, railroad cars at tipple, explosions of powder, etc.

During the year ending June 30, 1915, 455 fatal accidents occurred in this state. This shows a decrease for the year of 56. During the year ending June 30, 1916, the tonnage of coal mined per each fatality inside was 214,713 gross tons against 151,223 gross tons last year, and in the mines where fatal accidents occurred there was an average of one life lost for each 109,316 gross tons.

The following table shows the number of accidents for each county in which fatalities occurred:

County	Number of Accidents	County	Number of Accidents
McDowell	137	Preston	5
Fayette	76	Putnam	4
Raleigh	36	Ohio	3
Logan	31	Wyoming	3
Marion	26	Mineral	3
Harrison	13	Boone	2
Mingo	13	Grant	2
Mercer	12	Braxton	1
Kanawha	11	Clay	1
Tucker	6	Marshall	1
Taylor	6	Monongalia	1
Brooke	5	Randolph	1

There occurred in this state during the year ending June 30, 1916, 1177 nonfatal accidents as against 1628 for the same period last year, thus showing a decrease this year of 451.

During the fiscal year just past, there were employed at the mines and coke ovens 799,964 persons, a decrease under the figures for the previous year of 1364. These employees were classified as follows: Pick miners, 17,780; machine miners, 23,899; machine runners and helpers, 4291; inside laborers, 19,570; outside laborers, 12,255; coke workers, 2169, making the total number of persons employed inside 65,540, and the total number outside, exclusive of coke yards, 12,255; coke yard employees numbered 2169.

During the year ending June 30, 1916, the mines of this state were operated 232 days against 190 days last year.

The state's production by counties, coal in gross tons and coke in net tons, is shown in the following table, as compiled from the statistical reports for 1916:

	Coal	Coke
Barbour County	1,096,358	36,984
Boone County	631,664	.....
Braxton County	316,445	.....
Brooke County	594,909	.....
Clay County	479,320	.....
Fayette County	10,367,505	253,074
Gilmer County	121,036	.....
Grant County	178,420	.....
Greenbrier County	35,692	.....
Harrison County	4,813,808	32,282
Kanawha County	5,766,941	.....
Lewis County	23,482	.....
Lincoln County	109,406	.....
Logan County	8,162,390	.....
Marion County	6,189,891	88,441
Marshall County	1,018,842	.....
Mason County	109,655	.....
McDowell County	18,999,079	996,400
Mercer County	3,519,952	155,198
Mineral County	639,341	.....
Mingo County	2,938,443	.....
Monongalia County	501,101	92,792
Nicholas County	182,854	.....
Ohio County	643,840	.....
Preston County	1,246,189	142,219
Putnam County	531,589	.....
Raleigh County	6,099,519	.....
Randolph County	684,556	114,415
Taylor County	1,192,552	14,101
Tucker County	1,313,348	13,097
Upshur County	140,013	18,629
Wayne County	63,451	.....
Wyoming County	432,177	.....
Small country mines	300,000	.....
Totals	79,443,768	1,957,632

Wyoming District No. 1

By George Blacker*

Sept. 30, 1916, marked the closing of the most successful fiscal year in the history of coal mining in District No. 1 of the State of Wyoming. Although in the majority of the mines in this district during the past year there has been a scarcity of men, still the past year shows a greater production than for any other year in the history of Wyoming. The relations existing between the United Mine Workers of America and the operators have been cordial and mutually pleasant, and a contract was signed by both parties for a period of two years.

An improvement has been made in many of the mines, through the cleaning up of roads and traveling ways, by clearing them of the loose coal and débris that has been a source of much annoyance and danger, particularly to the drivers. The law is not plain on this point and technically is being taken advantage of.

In a great number of the mines in this district stock is stabled underground and in some of the stables a great deal of combustible material is used in their construction. Hay is taken into some of the mines without being covered, and after it is unloaded from the cars it is sometimes left lying along the entry or slope for a considerable length of time before it is removed. Wherever there are stables with a great deal of combustible material, hay coming into the mine uncovered and left around forms a constant source of danger. We have no law in regard to the building of underground stables and recommendations to operators without power to enforce them are of no avail.

I have recommended several times that the mining laws of the state be overhauled and amended and made to conform to present-day needs. This could be done in the following manner: That the legislature empower the governor to appoint a committee composed of an equal number of operators and miners, giving the committee authority to select an odd member. This committee should draft a bill that shall be enacted into a law by the coming legislature, retaining such parts of the present statutes as apply to present requirements and adding thereto such amendments as ought to be adopted for safety. It must be remembered that our principal laws on coal mining were enacted 25 years ago. At that time they were in line with progressive mining and in all respects commendable. But we are advancing steadily in our methods and are learning more as to the dangers in the mines and of the manner of avoiding them.

*State coal mine inspector, Cumberland, Wyo.

TONNAGE BY COUNTIES

	Output of Mines
Lincoln County	
Diamondville Coal and Coke Co.	
No. 1 Mine, Diamondville	200,258
No. 2 Mine, Oakley	231,884
No. 4 Mine, Glencoe	198,282
Total tonnage	630,424
Kemmerer Coal Co.	
No. 1 Mine, Frontier	12,380
No. 3 Mine, Frontier	242,156
No. 5 Mine, Sublet	217,321
No. 6 Mine, Sublet	176,638
Total tonnage	648,495
J. A. Quealy Coal Co.	
No. 1 Mine, Elko	83,667
Lincoln Coal Co.	
No. 1 Mine, Frontier	6,300
Union Pacific Coal Co.	
No. 1 Mine, Cumberland	66,256
No. 2 Mine, Cumberland	307,823
No. 2 South Mine, Cumberland	144,442
Total tonnage	518,521
Small mines	10,000
Total tonnage for Lincoln County	1,897,407
UINTA COUNTY	
Bear River Coal Co.	
No. 1 Mine, Evanston	37,685
Carbon County	
Union Pacific Coal Co.	
No. 2 Mine, Hanna	330,332
No. 3 Mine, Hanna	15,618
No. 3½ Mine, Hanna	144,363
No. 4 Mine, Hanna	236,409
Total tonnage for Carbon County	726,722
Sweetwater County	
Union Pacific Coal Co.	
"A" Mine, Superior	235,168
"C" Mine, Superior	273,685
"D" Mine, Superior	183,527
"E" Mine, Superior	206,331
Total tonnage	898,711
Union Pacific Coal Co.	
No. 4 Mine, Rock Springs	21,579
No. 7 Mine, Rock Springs	269,096
No. 8 Mine, Rock Springs	323,209
No. 10 Mine, Rock Springs	242,144
Total tonnage	856,028
Union Pacific Coal Co.	
No. 1 Mine, Reliance	503,483
Central Coal and Coke Co.	
No. 2 Mine, Rock Springs	249,314
Wyoming Coal Co.	
No. 7 Mine, Rock Springs	106,600
Lion Coal Co.	
No. 3 Mine, Rock Springs	153,606
Gunn & Quealy Coal Co.	
"B" Mine, Gunn	97,276
Total tonnage for Sweetwater County	2,865,018

SUMMARY OF FATAL ACCIDENTS

	1911	1912	1913	1914	1915	1916
Number of men killed	22	35	21	43	18	22
Number of men injured	97	120	65	100	107	220
Number of wives made widows	11	18	6	18	10	10
Number of children made fatherless	29	41	9	52	37	33

CAUSE OF FATAL ACCIDENTS

	1911	1912	1913	1914	1915	1916
Gas explosions	1	0	0	0	0	0
Dust explosions	0	7	0	0	0	0
Falls of roof (coal, rock, etc.)	14	18	9	18	7	12
Falls of coal other than roof coal	0	6	2	7	4	3
Mine cars and haulage motors	3	3	7	10	1	3
Explosives	3	0	0	3	1	1
Electrocuted	0	0	2	2	0	2
Miscellaneous	1	1	1	3	5	1

PRODUCTION OF COAL AND MEN EMPLOYED IN EACH COUNTY

County	Tons Produced	Men Employed
Lincoln	1,897,407	1,724
Uinta	37,685	57
Carbon	726,722	625
Sweetwater	2,865,018	2,432
Total tons produced	5,526,832	4,838

SUMMARY OF COAL PRODUCTION

Year	Tons	Men Employed	No. of Fatal Accidents	Total Coal for Each Life Lost	No. Employees for Each Life Lost	No. Killed per Thousand Employed
1911	4,865,761	5,446	22	221,170	248	4.1
1912	5,500,253	5,672	35	157,150	162	6.1
1913	5,229,817	5,670	21	249,038	270	3.7
1914	5,137,843	6,069	43	123,670	141	7.7
1915	4,460,169	5,363	18	247,787	298	3.3
1916	5,526,832	4,838	22	251,220	220	4.5

SUMMARY OF THE ITEMS SHOWN IN THIS REPORT FOR 1916

Number of counties producing coal	4
Number of shipping mines	31
Number of coal miners	2,291
Number of loaders	776
Other underground men	1,068
Boys under ground	27
Boys above ground	16
Others above ground	660
Total number of employees	4,838
Total tons of coal produced	5,526,832
Average days of active operation all mines	246
Kegs of powder (black) used for blasting coal	54,845
Pounds of permissible powder for blasting coal	257,556
Number of tons of coal undercut	3,350,826
Number of tons of coal blasted from the solid	2,176,006
Number of fatal accidents	22
Number of nonfatal accidents	2,220
Tons of coal produced to each fatal accident	251,220
Number of employees to each fatal accident	220
Number of employees to each nonfatal accident	22
Ratio of fatal accidents per 1,000 employees	4.5

I deem it of the utmost importance that our laws be made to keep step with mining in its advancing stages. In the interest of better discipline, measures should be enacted providing punishment of a drastic nature to those doing or allowing things to be done that are inimical to the safety of human life. That there is much room for improvement in our laws is evident to those who are posted on such matters. By the adoption of a method similar to the one above outlined a measure could be formulated to meet present exigencies and prove beneficial to the business of coal mining and be a credit to the state.

The foregoing tables show the important figures of coal production for 1916 in District No. 1 of Wyoming, according to figures furnished by the various operators.

Wyoming—District No. 2

The coal production in district No. 2 for the fiscal year ending Sept. 30, 1916, was 2,169,512.65 tons, or an increase of 360,691 tons over the previous year. It is a safe estimate that the production for the calendar year 1916 will exceed these figures by 500,000 tons.

Notwithstanding the great loss in tonnage due to the severe car shortage of the early part of the year, and again in the months of September and October, it was the largest production recorded for this section of the state. It is also a fact that very few of the mines now in operation have been working to their full capacity.

There were employed in the industry 2059 men, and the year as a whole was a prosperous one. Early in the spring, when the work at the mines began to slacken, many left the mines for other employment, which resulted in almost a shortage in some instances. However, as there will be an increased tonnage for the calendar year, there will also be a proportionate increase in the number of men employed.

Representatives of the operators and miners met in conference and a satisfactory wage agreement resulted that carried with it a general advance in wages of 2 per cent. The agreement was signed for two years and will end on Sept. 1, 1918.

PRODUCTION, MEN EMPLOYED, DAYS WORKED AND EXPLOSIVES USED IN DISTRICT NO. 2, WYOMING

	Tonnage	Underground	Outside	Days Worked	Explosives Used—Black Permissible, Kegs	
Sheridan County						
Acme Coal Co.	208,044.95	125	30	215	2,280	
Carney Coal Co.	235,581.00	240	34	125	2,960	
Kooi Mine	196,357.00	145	30	135	1,825	
Wyoming Coal Mining Co.	315,000.00	234	40	196.5	2,509	
Sheridan Coal Co.	188,404.00	116	16	160	2,351	
Amalgamated Dev. Corp.	3,783.00	15	8	32	27	
Totals	1,147,169.95	875	158	863.5	11,952	
Hot Springs County:						Lb.
Owl Creek Coal Co.	262,935.00	184	41	228	.....	60,000
Big Horn Collieries.	189,542.00	177	43	212.5	3,660	6,500
Totals	452,477.00	361	84	440.5	3,660	66,500
Weston County:						
Cambria Fuel Co.	365,200.70	359	57	213	3,002	13,000
Converse County:						
Fairview Coal Co.	30,000.00	20	10	140	800	.....
Fremont County:						
Poposia Coal Co.	174,665.00	110	25	201	5,000	.....

SUMMARY OF COAL PRODUCTION

	Tons Produced	Men Employed	Days Worked
Sheridan County	1,147,169.95	1,033	863.5
Hot Springs County	452,477.00	445	440.5
Weston County	365,200.70	416	213.0
Converse County	30,000.00	30	140.0
Fremont County	174,665.00	135	201.0
Totals	2,169,512.65	2,059	1,858.0

There were five fatalities for the fiscal year, or 1 fatality for 433,902 tons of coal mined, a record that has been exceeded but twice previously. The increased attention that is being given to the safety of the men is no doubt an important cause for this reduction in the number of accidents.

With the continuation of a strong demand for coal and an increase in price per ton at the mine, with the miners also receiving higher wages, the industry in 1917 will likely enjoy a spell of prosperity unparalleled in recent years.

With almost every kind of coal in great quantity in workable seams, there is no reason why, in the near future, this section of Wyoming should not be the great coal-producing district of the state.

Coal and Coke Production in the United States in 1916

The following tables have been compiled largely from data communicated by the various state mine inspectors, estimates having been made only where no such statistics were available, but in all cases upon the basis of reliable information:

PRODUCTION OF COAL IN THE UNITED STATES

States	1915* Quantity, Short Tons	1916 Quantity, Short Tons
Alabama	14,927,937	16,250,000
Alaska	1,400	9,000
Arkansas	1,652,106	2,000,000
California, Idaho and Nevada	12,503	12,000
Colorado	8,624,980	10,260,948
Georgia	134,496	140,000
Illinois	58,829,576	63,500,000
Indiana	17,006,152	(a) 18,738,256
Iowa	7,614,143	7,600,000
Kansas	6,824,474	8,000,000
Kentucky	21,361,674	25,106,500
Maryland	4,180,477	4,930,000
Michigan	1,156,138	1,056,393
Missouri	3,811,593	4,000,000
Montana	2,789,755	(b) 3,688,307
New Mexico	3,817,940	3,893,185
North Dakota	528,078	620,000
Ohio	22,434,691	30,500,000
Oklahoma	3,693,580	(c) 3,053,543
Oregon	39,231	39,230
Pennsylvania, bituminous	157,955,137	170,270,000
South Dakota	10,593	14,000
Tennessee	5,730,361	6,589,915
Texas	2,088,908	2,300,000
Utah	3,108,715	3,621,935
Virginia	8,122,596	9,300,000
Washington	2,429,095	3,000,000
West Virginia	77,184,069	87,989,000
Wyoming	6,554,028	7,650,000
Total bituminous	442,624,426	494,132,212
Pennsylvania, anthracite	88,995,061	88,312,000
Grand total	531,619,487	582,444,212

* United States Geological Survey figures. (a) For fiscal year ending Sept. 30. (b) Fiscal year ending Oct. 31. (c) Fiscal year ending June 30.

PRODUCTION OF COKE IN THE UNITED STATES

States	1915* Short Tons	1916 Short Tons
Alabama	3,071,811	4,250,000
Colorado	670,938	1,320,000
Georgia	20,039	25,000
Illinois	1,686,998	2,500,000
Indiana	2,768,099	3,100,000
Kansas	.....	.....
Kentucky	526,097	980,000
Maryland	313,283	395,000
Massachusetts	504,438	600,000
Michigan	(a)	(a)
Minnesota	127,847	135,000
Missouri	(a)	(a)
New Jersey	(a)	(a)
New Mexico	389,411	479,153
New York	684,461	750,000
Ohio	684,658	725,000
Pennsylvania	25,622,862	30,746,000
Tennessee	256,973	275,000
Utah	(a)	224,294
Virginia	629,807	700,000
Washington	136,552	140,000
West Virginia	1,391,446	1,900,000
Wisconsin	(a)	(a)
Combined States	2,095,430	2,300,000
Total	41,581,150	51,544,447

* United States Geological Survey figures. (a) Included in combined states.

Coal Production of Canada in 1916

Alberta

By John T. Stirling*

Complete statistics with reference to mining in the Province of Alberta during the year 1916 will not be available before the end of February, 1917. I am of the opinion, however, that the total output for the year will be between 4,250,000 and 4,500,000 tons. This shows an increase of approximately 1,000,000 tons over the year 1915.

A much larger amount of coal is being shipped from Alberta into the Province of Manitoba than formerly. During the first three months of 1916 the mines, particularly in the lignite field, worked more steadily than is usual for that time of the year, owing to the extreme cold weather. During these months, however, the output in the Drumheller district was seriously handicapped by a scarcity of railway cars. The output has also been interfered with to a certain extent by a shortage of labor, although during the last few months the labor supply has materially improved.

From Jan. 1 until Nov. 30, 1916, 39 new mines were opened and 52 were abandoned. The number at present in operation is 243.

During the same period 18 fatal accidents occurred, as compared with 18 for the whole of the year 1915, and 69 nonfatal, as compared with 66 nonfatal accidents during 1915.

During the year a mine-rescue car was installed in the Drumheller field. There are now three mine-rescue cars in operation, one in the Crow's Nest Pass, one in the Canmore and Bankhead district and one in the Drumheller district. Five mine-rescue stations are also maintained, three in the Lethbridge district, one in the Brazeau and one in the Jasper Park district.

The superintendent of each of these stations devotes a considerable amount of his time to instruction in first-aid work. On July 1, 1916, competitions in mine-rescue and first-aid work were held at Coleman. Twenty-four certificates of competency in mine-rescue work have been granted during the year, making a total of 253 certificates issued since the establishment of mine-rescue stations in the province.

Provision has also been made for the payment of men doing mine-rescue training at the rate of 50c. per hour. Two teams are kept at each mine, each team being expected to undergo at least one training each month.

A large number of mines in the province are adopting the use of electric cap lamps with quite satisfactory results. A number of electrical coal-cutting machines have been installed in different mines during the year.

Seven of the new mines that have been opened during the year are located in the Grande Prairie district, about 400 miles northwest of Edmonton, and are supplying coal to the settlers in that district.

British Columbia

By E. Jacobs†

The gross production of coal in British Columbia in 1916, including the coal made into coke, is estimated to have been 2,795,400 short tons as compared with 2,209,290 tons in 1915. It being the official custom of the province, however, and of the Vancouver Island coal-mining companies also, to record production in tons of 2240 lb., it will be more convenient to make comparisons in that measure. Accordingly, the gross production in 1916 is estimated at 2,495,893 long tons, against 1,972,580 tons in 1915 and 2,166,428 tons in 1914. The figures given for 1916 are subject to revision, since the production for the month of December has had to be estimated; but it is not thought probable there will be any considerable change made from the total here given. The following table shows the annual totals for seven years:

	Tons of 2,240 Lb.
1916 (estimated)	2,495,893
1915	1,972,580
1914	2,166,428
1913	2,570,760
1912	3,025,709
1911	2,257,718
1910	3,139,235

The coal-mining companies operating in British Columbia had in 1916 to contend against conditions that were not favorable to any considerable increase in the total quantity of coal produced, and this notwithstanding that the demand for coal was greater than in any of several previous years. First there was a general shortage of labor for coal mining, caused in part by enlistments for service in the European War by many of the English-speaking workers, and in part by the continued internment of numbers of "alien enemy" miners, who were not permitted to work in the coal mines but were detained under guard in internment camps. There were also so far as the mines of the Crow's Nest Pass Coal Co. were concerned, interruptions from an explosion in one of the Michel mines, and the serious damage by a series of "bumps" to the mine that was making the biggest production at the Coal Creek colliery. This caused a reduction of output from that particular mine from 1500 tons to 500 tons a day. However, on the whole substantial progress was made, as is shown in the following figures of production:

PRODUCTION OF COAL IN 1916

Vancouver Island

		Tons of 2,240 Lb.
Canadian Collieries:		
Comox (Cumberland) mines	453,122	
Extension mines	262,377	715,499
Western Fuel Co.		560,000
Pacific Coast Coal Mines		155,000
Vancouver-Nanaimo Coal Mining Co.		79,957
Total		1,510,456
Nicola Valley		
Inland Coal and Coke Co.		30,849
Middlesboro Collieries		49,146
Total		79,995
Similkameen		
Princeton Coal and Land Co.		24,553
Crowsnest		
Corbin Coal and Coke Co.		68,896
Crow's Nest Pass Coal Co.:		
Coal Creek	567,535	
Michel	244,458	811,993
Total		880,889
Summary		
Vancouver Island		1,510,456
Nicola Valley		79,995
Similkameen		24,553
Crowsnest (East Kootenay)		880,889
Gross production of coal		2,495,893

The increase in gross production of coal in 1916 as compared with 1915 was 523,313 tons. With one unimportant exception, namely, that of the Inland Coal and Coke Co., of Nicola Valley, which produced 3861 tons

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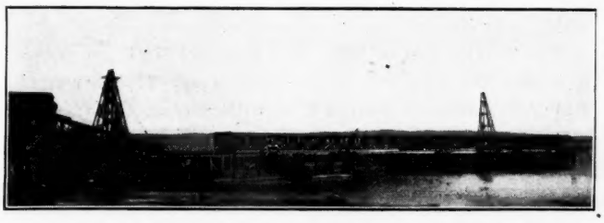
†P. O. Box 645, Victoria, B. C.

less than in 1915, all the companies whose figures are given in the accompanying table of production made an increase. The respective increases of the several companies were as follows: Canadian Collieries (Comox and Extension), 287,687 tons; Western Fuel Co., 144,277 tons; Vancouver-Nanaimo Co., 31,981 tons; Pacific Coast Coal Mines, 25,569 tons; Crow's Nest Pass Coal Co. (Coal Creek and Michel), 21,965 tons; Princeton Coal and Land Co., 9005 tons; Corbin Coal and Coke Co., 6352 tons; Middlesboro Collieries, 1343 tons; total, 528,179 tons. From this total there must be deducted decreases of 3861 tons of the Inland Coal and Coke Co., and 1005 tons of a syndicate that operated in Nicola Valley in 1915 but was not among the 1916 producers.

Figures of coal made into coke are estimates. Based on the average quantity of coal it took to each ton of coke



PACIFIC COAST COAL MINES LOADING DOCK WITH T-HEAD AT BOAT HARBOR, V. I.

in 1915, it is estimated that 92,405 tons of coal was used in making 28,044 tons of coke at the ovens of the Canadian Collieries, Ltd., at Union Bay, Vancouver Island, and that the Crow's Nest Pass Coal Co. used 187,050 tons of slack coal at its ovens at Fernie to make 129,000 tons of coke, and 164,475 tons at its Michel ovens to make 113,431 tons of coke. The coke figures total 270,475 tons, which quantity, manufactured in 1916, compares with 245,871 tons in 1915 and 234,577 tons in 1914. The coke made at the Crow's Nest Pass Coal Co.'s ovens was used chiefly at smelting works in the Kootenay and Boundary districts of British Columbia, which works would have taken more coke had it been obtainable; that made on Vancouver Island was used at the Granby Consolidated Co.'s smelting works at Anyox, Observatory Inlet.

Concerning value of products, it has been customary to calculate coal at $3.50 a long ton and coke at $6. If this custom be adhered to in arriving at the value of the mineral production of the province in 1916, it will give the following results: Net coal (that is, after deduction of 443,930 tons made into coke) 2,051,963 tons at $3.50, $7,181,870; coke, 270,475 tons at $6, $1,622,850. Total value of coal and coke, $8,804,720. The value of coal in 1915 was $5,638,952 and of coke, $1,475,226; total value, $7,114,178. Thus the increase in value in 1916 over 1915 was $1,690,542, on the assumption that similar prices, not higher ones, will be used officially for the 1916 production.

The Year at the Coal Mines

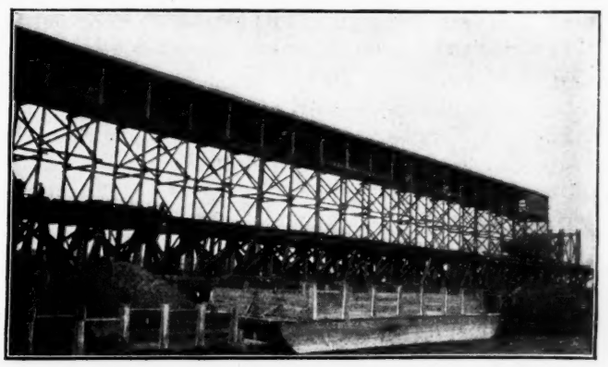
Vancouver Island—The Canadian Collieries (Dunsmuir), Ltd., operates several mines at each of its two collieries—the Comox colliery, in the neighborhood of Cumberland, some distance north of Nanaimo, and the Extension colliery, south of that old-established coal-mining center. Little can be stated concerning these operations other than that the mines worked were Nos. 4 and 7 slopes and Nos. 5 and 6 shafts. These are the mines in which much Oriental labor—Chinese and Japanese—is used underground. The last published official figures showed that out of a total of 795 men employed underground 376 were Orientals, 185 as miners, 133 as miners' helpers and 58 as laborers. With the exception of five at extension, nowhere else in the province were Orientals employed at mining underground. This has been one of the sources of labor troubles on Vancouver Island, the Cumberland mines being notorious in this respect.

At Extension Nos. 1, 2 and 3 power house a new unit was added in 1916 which increased the power output by about 50 per cent. This unit is a Fleming set with a 150-kw. generator and compound engine. In No. 2 mine the No. 4 East section has again been opened and will add substantially to the future production of this mine. Much development work was done in No. 3 mine, the most important part of which was the completion of a new air shaft. An Ottumwa 50-hp. electric hoist was here installed. At No. 4 shaft the plant has been electrified and power is now available for lighting, pumping and hoisting purposes. A four-stage electric turbine pump with 6-in. discharge was placed at the shaft bottom.

The slope sections of this mine, which had been flooded since August, 1912, were unwatered and development work was resumed. In addition to the underground development about 2500 ft. of diamond core-drilling was done, principally in hard conglomerate strata.

At the washery on the shipping docks at Ladysmith a new unit was added and the two old units equipped with automatic positive feed from the bunkers and automatic rock discharge. The gross output of coal was nearly 263,000 long tons as compared with 167,000 tons in 1915.

The Western Fuel Co.'s output was approximately 560,000 tons, as compared with 415,723 tons in 1915. The company operated in 1916 its No. 1 shaft, Esplanade (Nanaimo), and connecting mines, and its Reserve mine,



PACIFIC COAST COAL MINES NEW LOADING DOCK AT BOAT HARBOR, V. I.

situated 5 mi. south of No. 1; the coal in the Reserve mine is reached by two shafts at a depth of 955 ft.

The Pacific Coast Coal Mines, Ltd., operates two collieries—the South Wellington and the Morden. The latter is known as No. 3 mine; it is a comparatively new plant, with reinforced-concrete headframe and new equipment throughout. Two shafts reach the coal at about 600 ft. depth. After working for a time on a temporary bottom, a permanent bottom has been made at 6 ft. greater depth, and a rock slope has been driven about 900 ft. The coal is of excellent quality varying in thickness from 5 ft. upward; where the slope entered it the

seam was found to be 28 ft. thick. Permanent electrically driven pumps have been installed. A new lamphouse, an office and other surface improvements were made during the year.

At the shipping point, 8 mi. away, a new coalwashery was put in, and a new pier was constructed, commencing 60 ft. outside the old T-head pier and extending seaward for 400 ft. Its total width is 45 ft.; its height from the caps to the top of the superstructure is 52 ft. Nearly 500,000 ft. of lumber has been used in making this improvement, a prominent feature in which is a movable tower for loading the coal, the tower traveling the whole length of the pier on a 12-ft. gage track. A belt passing along the pier conveys the coal to an inclined belt which in turn delivers it into the hold of the vessel, getting down to 21 ft. or up to 72 ft. above water level with the loading boom. The mechanism of the tower, which is unique along the British Columbia coast, is operated by an electric motor. Its delivery capacity is about 300 tons of coal per hour.

At the Middlesboro colliery, Nicola Valley, the main slopes and levels in Nos. 4, 4 East, and 7 mines were extended. Demand for coal was quiet all through the spring and summer, but later in the year there was a brisk demand for all the coal that could be mined.

At the Princeton colliery a new bunker and screens to make pea coal were put in. Much underground development was done, including new haulageway and new airway for No. 2 mine; laying off fresh levels east and west from the main slope, and getting into coal of a better quality.

At the Corbin colliery, in the Crowsnest district, stripping was continued at the big open cut from which the coal is mined by steam shovel. Additions to the equipment there included a class 45C Bucyrus shovel and eight 20-yd. side-dump cars. A transfer plant was provided and connected with the Marcus screen so as to sort and grade coal from the open cut if desired. The output in 1916 was about 69,000 long tons, compared with 62,500 tons in 1915.

Nova Scotia

By R. D. Anderson*

The coal production of Nova Scotia for the fiscal year which ended Sept. 30, 1916, was 6½ million long tons, about 150,000 tons more than in the previous year.

The consumption of coal in the province was greater than in any previous year. This was due to the manufacture of munitions, which in part made up for the shortage in shipments up the St. Lawrence River, caused by the scarcity of carriers. The dearth of labor continues to be a serious hindrance to the production of coal and recruiting for the army has been discouraged in the mining counties.

A number of small mines have been reopened in Cumberland County, with a combined production for the year of about 7000 tons. The Marsh Mine, in Pictou County, the property of the Nova Scotia Steel and Coal Co., Ltd., which was closed in 1914, was reopened by a lessee and 4500 tons was produced.

The Colonial Mine and the MacKay Mine, in Cape Breton, which up to last year were operated by the Colonial Coal Co., have been transferred to the Bras d'Or Coal Co., under the continued general management of George B. Burchell.

The Dominion Coal Co., the largest producer in the province, added to its product 48,000 tons more than in the year before.

A fire occurred in the pipe-bord in the north slope of the Springhill Mines early in December and resulted in the closing of the slope. The fire is still burning.

The price of soft coal is now $7 per ton, with a strong demand and a probable higher price during the winter. Anthracite is quoted at $13.50 a ton.

No great number of fatalities occurred from gas explosions or other causes. The number of individual accidents is the smallest for some years, there being 29 fatal and 103 nonfatal, caused mostly by falls of coal and roof; as against 41 fatal and 163 nonfatal accidents in 1915.

The production of coke was 670,000 tons, an increase over the previous year of 217,000 tons. If the war continues for another year, the figures should be largely increased.

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Saskatchewan

The area in which coal is known to exist in workable quantities in Saskatchewan is situated toward the southern boundary and extends practically from Manitoba on the east to Alberta on the west, a distance of approximately 390 miles and estimated to be some 5500 sq.mi. in extent.

The coal is mostly lignite of a varying quality and of Laramie formation, and though there are about 117 mines in all, a large proportion are what are known as "farmers' mines" and are worked only during the winter, to supply the needs of the sparsely populated districts in which they are situated.

Some fairly extensive coal-mining operations are carried on, however, throughout the year at Shand, Estevan, Taylorton, Roche Percee and Bienfait, and considerable work is being done toward the development of coal production and brick manufacture on an extensive scale. Drilling for oil has also been done to some extent in the Roche Percee district.

Coal statistics for Saskatchewan during 1915, as prepared by the Bureau of Labor of the Saskatchewan Government, under which branch the Coal Mines Act of the province is administered, are as follows:

Number of mines in operation Dec. 31, 1915	29
Number of tons produced during 12 mo. (ending Dec. 31, 1915)	237,249
Average number of persons employed inside mines	280
Average number of persons employed outside mines	108
Number of accidents (fatal)	1
Number of accidents (non-fatal)	1

Interim reports received by the Bureau indicate a larger production for 1916 than in 1915, although it is at present impossible to state definitely to what extent as the demand depends largely on climatic conditions, and the consequent inability of a large proportion of the mine owners to furnish details of their output until early in the following year.

The Blue Shale Band in Seam No. 6 of Illinois runs from 1 to 2 in. in thickness and is situated about 20 in. above the bottom of the seam. It extends with much regularity over an area of at least 5,000 sq.mi. and is the most persistent impurity in Illinois coal.—E. A. Holbrook in "Dry Preparation of Bituminous Coal at Illinois Mines," Bulletin 88 Illinois Engineering Experiment Station.

Coal Briquetting in 1916

By C. T. Malcolmson*

To the casual observer it may appear that the present impetus to the coal-briquetting industry is attributable to this year's shortage of coal, particularly anthracite. No doubt this is a contributory cause, in that necessity has forced available substitutes upon the consumer, and thus brought him to a first-hand knowledge of the merits of this convenient and efficient fuel. The real reason, however, is more remote; I am safe in asserting that briquettes are at last becoming generally recognized in this country as a valuable adjunct to the dealer's coal supply. Reports from all parts of the country indicate a flourishing business in coal briquettes, wherever the mechanical problems of plant design have been properly worked out. Such failures as exist today can be attributed solely to weakness in this essential.

Beginning my survey with the Pacific Coast, it is authentically reported that its largest plant, that of the Pacific Coast Coal Co., has been running full capacity during the year, and since November has been operating double shift in order to catch up with orders. This plant contains one Rutledge press with a capacity of 30 tons per hour of 10-oz. "Diamond" briquettes made from the coals mined locally by the company, with a California asphalt binder. Plans are now under way to install a Komarek roll-type press for the manufacture of smaller briquettes, for which there is a growing demand.

The plant of the Los Angeles Gas and Electric Co. continues to produce a domestic fuel from the fine carbon dust obtained as a byproduct in the manufacture of its gas. A modified brick press is used. This makes the briquettes without a binder at the rate of 15 tons per hour. The product is allowed to "cure" in open storage piles for thirty days before being shipped. A similar plant is installed at Portland, Ore. Attempts to use a binder in briquetting the fine carbon have not proved entirely successful.

The largest briquetting plant in the United States is owned and operated by the Berwind Fuel Co., and is located on the company's dock at Superior, Wis. The Berwind plant, which has a total capacity of 75 tons per hour, contains a Rutledge press manufacturing 13-oz. briquettes, and a Komarek press producing 2-oz. briquettes. The Rutledge briquettes are still made with coke-oven pitch; during the past year, however, the Berwind Fuel Co. has added the necessary equipment to utilize the "Dutch" process for the manufacture of briquettes on the Komarek press with oil residuum as a binder.

In its plant at Superior, Wis., the Stott Briquette Co. has recently installed a second Belgian-roll press similar to the first one, having a capacity of 12 tons per hour of 2-oz. pillow-shaped briquettes. A mixture of bituminous and anthracite screenings is briquetted with Hydrolene as a binder. This plant is also working overtime to supply the demand for briquettes, which seems universal throughout the Northwest.

Improvement in the quality of its product, and the reliability of shipments due to perfecting of mechanical details in operation, have combined with trade conditions to increase phenomenally the sales of the Standard Briquette Fuel Co. at Kansas City, Mo. Here Arkansas semi-anthracite screenings are manufactured on a Rutledge press into 10-oz. briquettes with a coke-oven pitch binder, at the rate of 30 tons per hour.

The Detroit Coalette Fuel Co.'s plant completes the list of successful operations in the Middle West. This plant contains one Renfrow press of the plunger type, and has an output of 8 tons per hour of 10-oz. briquettes. Pocahontas screenings are briquetted with hard coke-oven pitch used in dry form.

The largest installation in the Eastern states is at Dickson City, Penn., where the plant of the Scranton Anthracite Briquette Co. has been rehabilitated, ready to be put in operation this month. This plant contains one Belgian-roll press and has an output of 30 tons per hour of briquettes weighing approximately 4 oz. each. Anthracite culm is briquetted with coke-oven pitch used in liquid form.

The Lehigh Coal and Navigation Co.'s plant at Lansford, Penn., has been operating successfully during the past year. This company was the first to adopt the General Briquetting Co.'s "Dutch" process. An edgerunner and the other necessary equipment was installed last year, and the result has been most encouraging. Anthracite culm is being briquetted with Hydrolene binder at the rate of 15 tons per hour. The average weight of the briquettes is 1½ oz. each. The output is sold in competition with domestic sizes of anthracite, and the new product is fast overcoming the prejudice against the briquettes with pitch binder formerly made at this plant.

In the South two plants are in operation. At Parrott, Va., the Delparen Anthracite Briquette Co. produces briquettes at the rate of 10 tons per hour from Virginia anthracite coal and Hydrolene binder; the briquettes are pillow-shaped, weigh about 2 oz. each and are made on a roll-type press. The other plant is one of the pioneers in this country, and was built at Phoenix, Md., by the American Coal Boulet Co. It contains two Belgian roll-type presses with a total rated capacity of 10 tons per hour of 1½-oz. briquettes. Georges Creek screenings are briquetted with an asphalt binder.

The war has brought about the opportunity for American briquettes to compete with Welsh briquettes in foreign markets. The most ambitious attempt at coal briquetting in America is a direct outgrowth of this opportunity. Last Autumn the Virginia Navigation Coal Co., Inc., awarded to the Malcolmson Briquette Engineering Co., of Chicago, a contract to design and build a complete coal-screening, briquetting and storage plant at Norfolk, Va.

This plant is designed to have an ultimate capacity for the production of 1,000,000 tons of briquettes and screened coal per year. Pocahontas mine-run coal will be shipped to the plant and passed through a tipple of 800 tons per hour capacity. The lump coal will be loaded direct to cars for delivery to the piers at Lamberts Point, and the screenings delivered either to the briquette plant or to a 50,000-ton storage plant. The briquette plant proper will be built for two Rutledge presses. One of these with a capacity of 40 tons per hour of briquettes weighing 16 oz. each will be installed immediately. Coke-oven pitch binder will be used. A Dodge anthracite-storage plant for 40,000 tons of briquettes will also be built. The entire plant will be of fireproof construction. A contract for the screening and storage plants has been sublet to the Link-Belt Co.

*Old Colony Building, Chicago, Ill.

Business Aspects of the Coal Industrv in 1916

By A. T. Shurick

SYNOPSIS—The unprecedented expansion in industrial operations of all kinds resulted in an extraordinary demand for coal and production for the year showed the second greatest increase in the history of the trade. Fuel shortages, which at times attained to proportions comparable only with conditions during the big strike of 1902, were reported in all sections during the concluding months of the year. Free tonnages of any description commanded spectacular figures at times. The Lake trade had an unsatisfactory year, owing to the great scarcity of vessels occasioned by heavy shipments of iron ore. Anthracite circular prices were advanced.

The United States produced 582 million tons of coal last year, exceeding the previous high record of 1913 by 13 million tons. This represents an increase over last year of 51 million tons, the greatest increase ever made in the modern history of the coal industry with the exception of the year 1907, which made a gain of 66 million tons over the preceding year.

It has been a year of great stress and momentous happenings. A demand of the most urgent character, bordering at times on the hysterical, developed during the last half of the year that whirled spot prices up to levels comparable only with the strike period of 1902. Threatened fuel famines became the rule rather than the exception. Drastic railroad embargoes were put into effect and rigid legal investigations of all descriptions were instituted, while abrogations of contracts were reported on every hand. Never in a period of normal production has there been such a desperate shortage of fuel as marked the concluding months of 1916.

Coal operators increased their earnings substantially, though not to the extent that might be expected. The rapidly advancing prices found a large percentage of the possible production covered by relatively low-priced contracts concluded under the usual conditions of severe competition; instead of being able to participate in the high prices ruling in the prompt market, therefore, producers were exceedingly hard pressed to meet their contract obligations. Arrogant demands for increased wages by the miners, often in direct violation of recent wage agreements, together with the increased cost of supplies of all descriptions, and difficulty and long delays in obtaining them, were further contributing factors on the wrong side.

In fact, the biggest potential achievement of the year was an accumulative one, the results of which will be reflected in the changed attitude of the sales agents when they face their contract buyers on Apr. 1 of the current year.

General Business Conditions

A proper perspective of our remarkable achievements in the business world during the past year is best obtained by a preliminary consideration of the disturbing influences in the face of which this record was made. Preëminently first were the highly strained relations that developed with some of the foreign powers, conditions on several occasions becoming so threatening that a severe panic would have undoubtedly resulted under normal conditions. In addition, the crop production for the year was regarded as a distinct failure, and with extraordinary demand from abroad the prices for farm products and other commodities were advanced to new high records, creating a general protest from the public. And, finally, the Presidential election exerted the customary restraining influence, which ordinarily would have been further accentuated by the fact that the results were interpreted as unfavorable to the big interests.

With these points in mind, we can turn to a study of the constructive features of the year's developments, better prepared to interpret their real significance. As the leader in this department, one naturally looks first at the export record, since it was upon this business, either directly or indirectly, that the entire prosperity of the country rested.

The gross annual exports for the United States first touched the two-billion dollar mark in 1911, and averaged only slightly more than that up to and through 1914. In 1915 they increased to three billion and a half, and last year to five billion and a half, the total increase in these two years thus representing nearly twice as much as was made in the entire previous history of the country.

The production of raw materials easily exceeded all previous records, our capacity in this respect being strained to the limit. The output of pig iron was 33 per cent. greater than ever before, with a price two and a half times that of two years ago. The copper output has increased from a billion and a half pounds in 1914 to more than two billion.

Gross earnings of the country's transportation lines increased 13 per cent., or 420 million dollars over the 1915 record.

Evidence of the tremendous activities in business is clearly shown in the statement of bank clearings for the year, which amounted to 263 billion dollars, as compared with 187 billion the year before; 1916's record in this respect shows an increase of 62 per cent. over the average for the previous decade. The total money in circulation in the country now aggregates an amount slightly less than 4½ billion dollars, as compared with 3½ billion in August, 1914.

It is estimated that dividend distributions in 1916 were 800 million dollars greater than in 1914. National bank deposits increased 2½ billion dollars.

The Future Outlook

During this interval we have become essentially a creditor nation. It is estimated that over two billion dollars' worth of foreign-owned American securities have been repurchased in this country, while a net balance of one billion dollars in gold has been received. The American dollar has become the standard of exchange the world over, and our bank resources exceed those of all the combined banks of Europe.

Brilliant as this record is, it belongs to the past, and we are now eagerly looking forward to what the future has in store. The one outstanding fact ahead of us is

that a turn is at hand, for the obvious reason that the full capacity of the country has already been reached and there is no further room for increases. The dominant thought at the opening of the year is the question of peace in Europe, and it is gratifying to note the growing tendency to regard this as a constructive factor instead of the reverse. If the end is not at hand, it is obviously approaching a period of greatly increased momentum with an inevitably tremendous increase in both cost and lives, not to mention the growing menace of our becoming involved in the struggle.

But in spite of the many uncertainties, there are no reasons for anticipating anything but a prosperous year ahead. Business is on a firmer basis, and better adjusted to the high speed now prevailing. In addition, it must be remembered that enormous reserves have been accumulated out of the extraordinary prosperity that will make our industrial and financial institutions able to cope with a reaction of the severest kind. The year ahead will undoubtedly see less of the spectacular expansion of 1916, but on the other hand, no serious interruption to progress is anticipated.

Early Strength of the Bituminous Market

The constantly increasing strength that characterized the closing period of 1915 carried over into the new year and, for the first time in about eight years, operators were reasonably sure of a sustained twelve-months period of profitable figures and active operations.

Evidence of the general expansion in business was seen in the uniform increases in the tonnage statements of all descriptions. The anthracite shipments made a gain of 2½ million tons in the first two months of the year. Shipments of the Pennsylvania R.R. indicated an increase of 3½ million tons for the same period and the Norfolk & Western 2,000,000 tons. Exports were increasing very rapidly and showing a substantial gain in spite of the heavy losses in the movement to Canada, occasioned by the depression incident to the war.

By the time the fall trade began to open it was obvious that the big interests were exerting their best efforts to put the brakes on what threatened to be a runaway market. The mines were beginning to run shorthanded, car supply was inadequate, while big industrial consumers were requiring tonnages in excess of what their contracts called for, thus throwing a very substantial extra demand in the spot market. Coal salesmen were withdrawn almost entirely and the operating interests became very critical on the matter of credits, arbitrarily cutting off shipments to any consumers in arrears.

The one unexpected turn to the situation was the fact that the burden of the high prices was in a number of instances turned back on the wholesale and operating interests. They were under very stiff contract obligations that not only prevented them from participating to any appreciable extent in the high spot prices, but in a number of instances forced them into the market for supplemental tonnages to meet their contracts. It has been well recognized that the conditions of competition have forced prices to the very minimum, and many of the agencies that bid so aggressively for business now realize their mistake.

With consumption at record-breaking proportions in the early fall, the usual increase in domestic buying at this time found supplies scarce, with the result that prices were bid up in an extraordinary manner. A great deal of exaggerated newspaper publicity created a general scare and precipitated buying of the most reckless description. The shortage developed by the big floods in West Virginia during the summer was also a contributing factor.

The Shortage in the Fall

In the steel industry the mills were operating far in excess of any previous record and fuel requirements were running considerably ahead of contracts. With profits ranging at heretofore unheard-of figures, the steel men were not disposed to take any chances on their fuel supply, which formed a relatively insignificant item in comparison with their returns. As a result inquiries developed from this source, and the matter of prices was a secondary consideration.

Conditions reached the point where some steam consumers were hard-pressed for sufficient supply to keep their plants in operation, the situation becoming acute in the case of a number of public service corporations. As was to be expected, the customary complaints against the coal industry in general began to appear, and investigations were instituted by Federal, state, and municipal authorities in all parts of the country.

These abnormal conditions created an unstable situation in the market, particularly as regards Middle Western coal, which seemed to be meeting the stringency in much better shape than other districts. As a result of this there was a material broadening in the market for these fuels. Shipments were made into Ohio, and even as far east as Buffalo and New York, a most unheard of market for Illinois coal. Demand for these fuels also began to develop in other directions. A temporary strike of the miners in the Oklahoma coal field created quite a little inquiry, while orders were received from Western points, such as Kansas City. A very urgent demand appeared in the Northwest. Lake shipments in this direction were substantially below requirements and it was clear that consumers in that district would be obliged to rely, to a great extent, on all-rail shipments.

Had it not been for a long period of warm weather that prevailed well into December, it is certain that critical conditions would have developed in the coal supply before the end of the year. As it was, the situation was kept moderately well in hand.

The Coastwise Market

At no time during the year did the coastwise market display any significant weakness, while most of the time it was very strong, and, on occasions, establishing almost record prices. Quotations were firm in the early part of the year, and in April the expiration of old contracts and embargoes against all-rail deliveries forced considerable extra buying. Even as early as this the poor condition of the railroads and the uncertainty in ocean freights were the cause of no little apprehension.

The demand eased off somewhat in May, but this was due largely to the shortage of marine transportation. Stocks were by no means excessive, while the abnormal prosperity in industrial lines was assuring a maximum consumption for some time to come. The uncertain outlook in both water and rail transportation made it exceedingly difficult for the buyers to judge which source of supply they could best rely upon. There was a general

tendency at this time to hold off, pending further developments.

The middle of the year found shippers running behind on their contract obligations and some using steamers exclusively were beginning to ship in barges. Supplies were fairly good at Hampton Roads, there being no detention from that cause, and the chief difficulty was the shortage of coastwise transportation facilities.

The beginning of the last quarter found a perceptible shortening up in the supplies at Hampton Roads. This was in sympathy with the general shortage that began to develop in all the markets at about this time. Shippers from Hampton Roads had to exercise considerable caution in accepting additional marine transportation, due to the difficulty in obtaining tonnage promptly. No guarantees as to shipments could be made, and the amount of free coal available became steadily less.

The beginning of the acute shortage that characterized the anthracite trade in this section at the close of the year also developed at this time. Substantial premiums were beginning to appear on independent anthracite.

One gratifying feature of the strenuous time that marked the last quarter of the year in the coastwise market was the excellent way in which shipments on contracts were maintained. Surprisingly little complaint was heard from buyers who were adequately covered. Evidence of the trend of conditions on new contracts was seen in the material advance in the price of bunker coal, which in November was announced as $5 per ton for 1917.

The Export Business

Perhaps the most significant fact in our export business was that it actually showed a very marked falling off. Government figures, of course, indicate an increase of from slightly less than 11 million tons in 1915 to between 15 and 16 million tons for 1916. But by far the larger proportion of our theoretical exports go to Canada, which it does not seem proper to consider as a factor in discussing what is commonly interpreted as the real export business. Disregarding these figures, therefore, the real off-shore exports in 1916 amounted to only about 7¼ million tons as compared with 8½ million in 1915.

With British foreign shipments showing a heavy decline month after month, Germany practically eliminated from the world's coal markets, and our own exports falling off, it is difficult to arrive at a satisfactory explanation of how this deficiency is being made up. The only real explanation seems to lie in a generally reduced consumption in the foreign markets, or possibly in a largely increased export business from the smaller producing countries where no recent statistics are available.

Foreign inquiries involving enormous tonnages were received in this market during the year. It is clear that the shortage of coal in Europe is the most severe in recent times, the situation frequently reaching a point where prices were so prohibitive that only those companies making abnormal profits on war orders were able to meet the high figures. In the more remote markets, as for instance Russia, it was frequently necessary to adopt substitutes, such as wood and peat.

Among the numerous inquiries for tonnage from abroad, perhaps one of the largest was a request for bids on five million tons, which appeared in April. Deliveries on this business were to be made to French and Italian ports, and at various periods from six months to two years.

Considerable difference of opinion exists in this country as to the permanency of our export trade. It has been generally the case that our high-grade coals have given satisfaction as compared with the best Welsh product where given a fair trial, but there are some observers that expect little of permanent benefit to accrue to us in this business.

One definite opinion advanced on this point is that Europe will require 20 million tons of American coal during the first year after peace is concluded, 10 million the second and 5 million the third; from this time on American coals will cease to be a factor in the European market, while the British operators will gradually resume their former position in the world's market and American exports will return to their slow growth, corresponding to the gradual expansion in our general export trade.

On the other hand, the financial weakness of the foreign countries will undoubtedly be a potent influence in favor of American exporters; particularly is this true in those frequent cases where foreign coal exporters are largely dependent on Government subsidies, as in the case of the Westphalian Coal Syndicate in Germany.

Furthermore, some of our leading financial institutions have established branches in South America, thus eliminating an important stumbling block in the matter of exchange and at the same time tending to establish more intimate relations with the business interests in that country. In addition to this our merchant marine is increasing rapidly and, finally, one significant fact usually lost sight of is that our facilities for loading coal far exceed those of any other country in the world.

The Pennsylvania coals were largely eliminated as a factor in the export trade during the year, due principally to difficulties in transportation to the seaboard. This was quite clearly brought out when the bids for the Navy and Panama R.R. contracts brought no quotations whatever from the Pennsylvania shippers, who said that they would be unable to meet the Government's exacting requirements as to deliveries.

Ocean Freights

Never before in the history of the American coal industry have exporters in this country been so keenly interested in the question of ocean freights. Extraordinary demand for vessel tonnage prevailed throughout the year. Demands for commodities of all kinds by the warring nations in Europe were constantly increasing, while the losses occasioned by German submarines further accentuated the shortage.

The coal shortage in Europe forced Great Britain to establish some further drastic regulations concerning bunkering and foreign shipments. On Apr. 25 the Government announced that no coal would be given any vessels sailing for a foreign port unless it was already chartered for a return trip with cargo. This move was made necessary by the great scarcity of vessel tonnage, and the fact that a great many ships plying in this trade were returning in ballast.

As compared with 1914, the last normal year previous to the war, ocean freights to foreign ports, both European and South American, had increased as much as 400 per cent. by May, while even those to more adjacent points had increased from 100 to 200 per cent. The increase

continued with monotonous regularity, reaching its culmination about the first of June, as will be noted in the accompanying table, showing the weekly rates to two representative points, one in Europe and one in South America.

At the peak of the advance, rates to Italy were $33.60 per ton, as compared with $9.60 at the same time a year previous. To Montevideo the same rates were $20.40 and $8.60, respectively. From this time on there was a gradual, though moderate, recession in rates until the middle of November when a sharp advance occurred in freights to the west coast of Italy, the rates advancing in the course of three weeks from approximately the lowest level of the year to substantially above the highest ever recorded at the close.

The accompanying table shows the progressive increase in ocean freight rates to two principal destinations—the west coast of Italy and Montevideo.

1915	West Coast Italy	Montevideo
Oct. 23	$14.40	$8.88
30	15.60	9.60
Nov. 6	15.60	9.60
13	16.80	10.80
20	16.80	10.80
27	19.20	12.00
Dec. 4	21.60	12.00
11	21.60	12.00
18	22.60	12.60
25	22.80	12.60
1916		
Jan. 1	22.80	12.60
8	25.20	13.00
15	25.20	13.00
22	29.50	13.50
29	29.50	14.40
Feb. 5	27.60	15.00
12	26.40	15.60
19	26.40	16.80
26	26.40	18.00
Mar. 4	27.60	21.60
11	27.60	22.80
18	27.60	24.00
25	28.80	24.60
Apr. 1	28.80	25.20
8	31.20	24.00
15	31.20	22.80
22	33.60	21.60
29	31.20	20.40
May 6	31.20	20.40
13	31.20	20.40
20	33.60	20.40

1916	West Coast Italy	Montevideo
May 27	33.60	20.40
June 3	33.60	20.40
10	33.60	20.40
17	31.20	19.20
24	30.60	19.20
July 1	30.60	19.20
8	28.80	18.00
15	28.80	18.00
22	28.80	18.00
29	27.95	18.25
Aug. 5	27.95	15.80
12	27.60	15.00
19	27.60	15.00
26	27.60	15.00
Sept. 5	26.40	14.40
11	27.60	14.40
18	27.60	14.40
25	27.60	13.20
Oct. 2	25.20	13.20
9	26.40	13.20
16	26.40	13.20
23	26.40	12.00
30	26.40	12.00
Nov. 6	26.40	12.00
13	24.00	13.20
20	26.40	13.20
27	30.00	14.40
Dec. 4	31.20	15.60
11	32.40	16.80
18	33.60	18.00
26	39.60	19.20

The Anthracite Industry

The anthracite industry has passed through the most turbulent year in its history. The so-called trusts have been subjected to governmental investigations of every description, while the industry itself has been obviously lacking in the effective coördination that has characterized it in recent years. In fact the past year has witnessed the most amazing indecision and panicky reversal of plans. Time after time we have had pitiful examples of an abject subservience to threatened investigations.

The first, but probably least important, was that started by the State of Pennsylvania, which appointed a commission that early in the year instituted an investigation of the retail trade. The purpose of this investigation was primarily to determine whether the retail interests had reimbursed consumers for the amount of the Pennsylvania State Tax, this law having been declared unconstitutional. Obviously the conditions under which retailers sell are so varied that this could not well be determined except by a separate investigation of each dealer, so that the action was doomed to failure from its inception.

When called before the investigating committee in Philadelphia toward the latter part of the year the dealers met the inquiries of the commission with a disconcerting frankness that made it clear that they welcomed the opportunity to demonstrate the small profits accruing in their business The chief result of the investigation was to bring out the discriminatory freight rates and wholesale prices of coal at Philadelphia as compared with other markets. This point will undoubtedly prove a factor in substantiating the considerable reduction in freight rates ordered by the Public Service Commission of Pennsylvania a year or more ago.

An interesting episode of the year was the refund of the Pennsylvania State Tax in the early months, this law having been found unconstitutional. This tax covers the period ending May 31, 1915; on June 1 of that year the legislature enacted a similar measure which it is thought the companies will not find so vulnerable as the previous law. The old tax law became effective July 1, 1913, and various methods were adopted for covering it, some of the companies simply including it in their circular prices and others adding it as a separate item.

In May the coal-consuming public was treated to the strange spectacle of the anthracite operators haggling among themselves over the question of prices. Following the precedent of other years, it was expected that price schedules would be announced, but when this was delayed beyond May 5, inquiries became urgent. The circulars were apparently on the point of being issued several different times, only to be hurriedly withdrawn at the last moment. Finally, a circular was issued and some business was negotiated. But the following day the Department of Justice in Washington issued a threatening statement announcing its intention to investigate the possibility of collusion in the fixing of coal prices, and the circular was hurriedly withdrawn.

Another incident illustrating the indecision and unusual lack of cohesion among the anthracite interests was the persistent rumors at different times that the anthracite sizes were to be changed. In fact these rumors crystallized into an actual change during June, when considerable coal originating in the Hazleton and Wyoming regions, made up of new sizes, arrived at the distributing centers. The shipments were made entirely without the knowledge of the recipients and protests from the latter were accorded slight attention. But again we have an example of an abrupt reversal in form, when in July the old sizes were again shipped, it being understood that a breach of faith among the companies concerned occasioned the change.

Acting in accord with the general trend of business, the year has witnessed a tremendous boom in the anthracite trade with the demand very active and at top prices. Anticipation of labor troubles at the mines occasioned rather unusually heavy stocking early in the season, though this proved a big advantage even as early as June, when the demand was substantially stronger than in normal seasons. This steadily increased as the season advanced and was due largely to the plethora of money occasioned by the great prosperity of the country. By October there were exceptionally strong demands from the West and New England, where fair premiums were offered by consumers desirous of making sure of their stocks before the bad weather began. The shortage was also being felt in the East by this time, though the big companies continued adhering to their circular prices.

The following month, however, a spectacular advance occurred, due largely to a great deal of uncalled for publicity in the daily press. There was undoubtedly a shortage of moderate proportions, as was evidenced by the un-

satisfactory shipments and largely increased demand, but there was certainly no occasion for the hysterical scramble for coal that ensued.

Inadequate transportation facilities, shortage of miners and numerous incipient strikes interrupted production, and in spite of the most strenuous efforts some of the bigger companies began falling behind as much as 10 per cent. below their normal output. In addition to this the heavy reserve stocks carried by the anthracite companies were practically cleaned out by the first of the year, an almost unprecedented situation for this season.

The Lake Trade

In spite of the prosperity in other lines, the Lake trade was not entirely satisfactory, particularly to the Pittsburgh district shippers. Contracts had been negotiated at relatively low figures, while the labor difficulties about the middle of the year occasioned many defaults on contracts, which forced buyers to seek other sources of supply. The rates offered on iron ore shipments also created a scarcity of vessels, while the shortage of coal frequently delayed loading and vessel owners found it more profitable to make the up-trip light. Under these conditions it is not surprising, therefore, that the season wound up with a shortage of coal at the upper Lake ports.

There was a tendency to disregard warnings of a possible shortage at the upper ports early in the season, though views in this respect were altered before shipping had progressed very far. Coal became scarce, while consumption attained to record-breaking proportions, and vessels could be had only on firm contracts. The opening prices at Milwaukee were 25c. above the previous season, and when the November circulars were issued lump and stove coal were the only grades quoted and these also were withdrawn on Nov. 20. Receipts to the first of December at this port were over 300,000 tons below normal, and with consumption at a maximum rate it was estimated that supplies would be completely exhausted by Feb. 1, should the weather conditions be normal.

One of the results of the acute shortage that prevailed at the opening of the year was the heavy demand from outside markets for coal from the Pittsburgh No. 8 district. This demand came from points as remote as New England, where a considerable tonnage was shipped, though not as much as into Buffalo and Rochester, N. Y. This business was short-lived, however, due to the railroads placing embargoes against such shipments.

Another unique development was the incursion of Pittsburgh No. 8 coal into the Pittsburgh district for the first time in a great many years. This was occasioned by a strike of the miners in that section which brought about a shortage in the fuel supply that caused some industries to close down temporarily.

Market Conditions in the Middle West

The domestic trade in the Middle West section was unusually slow in accumulating its customary reserve stocks through the summer period, though by August there were significant indications of an active market in sight. This was due primarily to an unprecedented demand for steam coal, resulting from the heavy pressure of work in all manufacturing lines. High prices gradually developed in the early fall, while operators began to anticipate the possibilities of a profitable market and became cautious about further commitments. The scarcity of labor also began to be a factor as the fall season approached and the market outlook had seldom been more encouraging.

By November a serious shortage was evident in the Middle Western section and the relatively mild weather that prevailed well up into December was the only thing that prevented a runaway market. Demand for coals of all kinds was substantially ahead of the available supply and spot offerings were scarce. The shortage was also much accentuated by an unexpected demand from remote points never before reached by the Illinois operators. The regular annual shortage of railroad equipment was a further factor in the situation and was unusually acute. Plans to withdraw some 15,000 cars from the iron ore regions of the Northwest for temporary use in the coal sections gave some hope for relief at the close of the year.

There was a particular scarcity of anthracite coal in this section when the winter trade got under way. Shipments were substantially below normal and independent coal was commanding good premiums. How critical the situation was is evident by the fact that 90 per cent. of the anthracite shipments were being made in open cars, when normally closed cars are used exclusively.

Another factor in the Middle Western situation was the growing evidence of a general coöperation among the operating interests. This move spread into the fifth and ninth districts of Illinois, where it was considered there was little possibility of bringing about any uniformity of action because of the great diversity of interests of the operators in those districts.

Increased Use of Equipment

An interesting development of the year was the rapidly accelerating increase in the use of mechanical equipment in the coal industry. The increase is distributed in all branches, and in the final analysis it indicates that we are only fulfilling our destiny as predetermined by the older European countries. Germany, with her lean coal, has been able to make herself an important factor in the world's coal market only by the excellence of her mechanical preparation. Great Britain, though possessing high-quality fuels, has held her preëminent position in the foreign markets largely for the same reason. This, American exporters, attempting to compete with the English fuels, have repeatedly discovered to their chagrin.

The tendency today, therefore, is toward more elaborate mechanical equipment. A determining factor in this connection is the aggressive competition in the industry. Far-sighted operators are awakening to a realization of the fact that a thorough preparation of their product to meet the exact requirements of the consumer is one of the chief controlling influences that will assure them a sustained market for their coal.

Up to a decade ago, conservative old-time managers were frankly prejudiced against the installation of much machinery, on the theory that a break in any one link of the chain completely ties up a plant, and the longer the chain the more possibilities of a break. The theory was undoubtedly based upon a sound principle, and would have continued indefinitely had not the consumers become more discerning in the matter of their purchases, to the advantage of the progressive operators who offered them a better-prepared product. As a result, the industry is facing the dawn of a new era, in which the experts on preparation will become a dominating figure.

Market and Shipping Conditions on Atlantic Coast in 1916

By G. G. Wolkins*

SYNOPSIS—A year of continuing disturbance in every branch of the trade. The lack of miners, uneven car supply, congestion at the loading piers either of boats or of cars, and the shortage of vessels helped make up a record that included the highest prices known since 1902. For six months the Pocahontas and New River agencies sought buyers and the balance of the year the buyers pounded the agencies. Georges Creek passed through a disheartening season, in arrears in every direction. Export and bunker trade, at times, reached record figures. The Pennsylvania grades were less a factor at Tidewater than in recent years, partly because restrictions on traffic to New England caused increased shipments elsewhere. Operations in all regions suffered, in greater or less degree, from the overweening push for tonnage in 1915.

Every coal year has its leaning toward the unusual, but 1916 is clearly entitled to the lead in this respect. Other years had their labor disturbances, their car shortages, their high prices, but never has there been so long a period of sustained irregularity as in the twelve months just ended. The country has enjoyed a year of unparalleled prosperity, but the seaboard coal trade as a whole has not profited in anything like the degree that might be looked for.

True, we had record prices, but because of 1916's peculiar inheritance the large factors in bituminous suffered for the sins of 1915, due to the old-time grasp for tonnage that is always so hard to control. In January the newspapers were giving publicity to all the serious phases of car, labor and boat shortages; in December they were but striking the same note with more emphasis. Aside from the recessions usual in the spring, after a hard season, the twelve months as a year measured a steady climb in prices, while all the time a large number of hapless contractors were struggling to make good on their old and long-term obligations. That, in a word, is the record of 1916 in the coastwise market.

General Features

Manufacturing in New England thrived, fuel demands were greater, and in spite of all the adverse conditions receipts of coal were heavier than ever before. And the remarkable thing is that buyers of every kind are apparently reconciled to higher prices. There is a distinct feeling that coal is only getting its share of the wave of higher return that prevails on most commodities. The anthracite operators, for instance, made their appeal with commendable frankness, and when domestic sizes were scaled up as a result of the wage settlement the public paid the bill, and nothing was said. As long as the buyer could be assured of his special supply, large or small, he was inclined to be grateful, and the record of 1916 was singularly free of that recrimination so familiar in other years.

The flurry of November and December, 1915, gave an impetus that persisted throughout the year. Tidewater receipts continued light through January; the mild weather that intervened only postponed the reckoning. The price paid by the buyer in distress created the "market" for spot coal. Until well into the spring the great anxiety over deliveries completely overshadowed all consideration of season purchase.

Consumers who otherwise would have been forced into the market on the expiration of old contracts were able in some cases to arrange quietly for supplies through the same channels, leaving the price to be adjusted from month to month. Measures like this kept a number of well-connected buyers from open purchases. The lot of the consumer without a 1915-made contract was hard, but even the buyer with contract in hand was not without his full share of anxiety. If his contract did not cover all requirements, or if his contractors were in arrears, he could not be sure which was better—to turn to the railroads for all-rail delivery or to rely upon a sufficient supply of boats to see him through. In neither direction was there much encouragement.

Until the situation cleared, practically all the shippers declined flatly to make prices for extended shipment and, as usual, New England "marked time." The larger volume of choice business had been closed the previous October, but for the others the longer the wait the more complicated the outlook. It was seen that the New England situation would be largely dependent upon waterborne coal, and by May and June the more far-sighted had covered themselves one way or another; the remaining few stayed out to help other unfortunates bid up prices as the season advanced.

Inadequate Transportation Facilities

It was the sudden revival of commerce that did the mischief. The railroads were unprepared and the shortage of cars mounted to unheard-of proportions. Every effort at remedy proved futile, so far as any significant improvement was concerned. Directions of the Interstate Commerce Commission were followed. But from a sectional standpoint, hardship rather than benefit was the result. New England cars did not figure high enough in percentage as compared with those of other sections, and it was only the more difficult for this territory to get its quota of coal. When all is said, only tremendous increases in equipment and track and other facilities could have given any real relief. That the shortage of cars was not wholly the cause of congestion appeared in frequent cases where trains were stalled for lack of adequate motive power.

Frequent embargoes from January to December brought conditions home to New England and threw a greater dependence upon water coal than has heretofore been the practice. It was soon found that operators, anthracite as well as bituminous, were being obliged to load cars for sections where the need was not so great

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to the exclusion of other sections where there was genuine distress. The New England railroads themselves anticipated interruptions by establishing new storage depots and simply dumping coal on unoccupied land. In this way only did they assure themselves of a sufficient reserve supply.

The Export Situation

An outgrowth of the traffic situation was the tendency of central Pennsylvania operators, particularly those who mine the higher grades, to place their output with iron and steel industries, munition plants, etc., for the most part on immediately connecting lines to avoid as far as possible the difficulties of car service. This was reflected not only in a disposition to side-step New England tonnage, but also in a determination not to become heavily involved with deliveries to Tidewater.

The railroads to New York and Philadelphia were groggy under the strain of general traffic, and agencies of Pennsylvania steam coals that had laboriously built up a standing with the Government in competition with Hampton Roads bowed themselves out. Tenders were made of 750,000 tons for the Navy in May, and upward of 600,000 tons in September for the Panama R.R., but not a single Pennsylvania coal was represented. The Government is an exacting customer. Battleships and colliers have to be coaled often at short notice, under heavy forfeitures, and the risks are great. The Virginia railroads were in far better shape to handle comprehensive orders, but with all their facilities they were hard put to it to give even passable service.

The same conditions operated against any heavy export trade from Philadelphia. At Hampton Roads, on the other hand, under war circumstances, offshore is frankly the preferred market and most of the tonnage that could be rescued from coastwise commitments was turned in that direction. Even at $7 f.o.b. the British coals could be undersold at most foreign points, especially in South America.

Taking all the Atlantic ports together, however, the export figures show a decrease compared with the year previous, an outcome due partly to railroad conditions and partly to the shortage of carriers. Bunker tonnage, however, made a large gain; for the first nine months it amounted to 25 per cent. Contrary to custom, ships bunkered to capacity on this side, on account of lower-priced fuel. As in 1915, therefore, the offshore trade was a considerable factor.

Difficulties in Coastwise Shipping

The shortage of bottoms was another continuing obstacle to coastwise trade. Only those interests who owned or controlled transportation could make delivered prices for any period, and offshore freighting was so attractive that, speaking broadly, New England was held down to bare contract requirements. In cases like that of the Georges Creek factors, where deliveries were notably in arrears, the deficit usually had to be made up in the open market, partly through the purchase of speculative cargoes. Unfavorable weather through June, July and August only added to the difficulties of transportation.

On top of everything else mines in all the regions were short-handed. New wage scales were agreed upon in the Pennsylvania bituminous districts as well as in the anthracite, supplemented by numerous special and local adjustments. The car situation only aggravated conditions, because mine workers were not inclined to stay unless given the opportunity of continuous work. The year was a hard one in which to keep miners, man-power being short in every industry.

Perhaps the saddest chapter in this record of unusual features is the extent to which the wholesaler bore the brunt of all the shortages. Not only were producers unable to take full advantage of panic prices, but they were under stiff obligation to fill contracts undertaken when tonnage seemed the only objective. The real agony came when the very agencies that moved heaven and earth to secure contracts at any price then obtainable were forced to pay the full current spot market to their less eager competitors in order to meet contract requirements.

The year was one long season of continued anxiety. Strike possibilities in March and April were succeeded by local difficulties and dock troubles, and by the threatened tie-up of the railways in September. Disturbing influences were frequent and exasperating, and it is no wonder that hysterical buying and a runaway market were mildly indulged in during the fall. When ocean liners have to call at three different loading piers to fill their bunkers and big ships wait eight and nine days for cargo, it is time to admit the coal market has reached an acute stage. Prices jumped fifty cents and a dollar at a time, but there was an anchor in the shape of long-term contracts. Gradually shippers confined themselves to their obligations and spot sales grew less frequent.

After a brief period of recession in prices, due largely to the mildest November weather in twenty years, the coastwise market regained strength, although perhaps more close-hauled than before. All the interests proceeded very cautiously, but there was no tangible prospect of easier conditions for a long time to come. At the close of the year prices advanced by shorter steps, but the trend was no less firm. Sales were rare, and usually for smaller tonnages, but there was more confidence in current levels than was the case earlier.

The twelve months together formed a unique experience for the coal trade. If relief was in sight the latter part of December, there was no one willing to name the quarter whence it would come.

Pocahontas and New River Grades

With boats scarce throughout the year, Hampton Roads seemed peculiarly remote from New England and deliveries much restricted. Consignees could roughly be divided into two classes; those who had coal due them not only up to Apr. 1, 1916, but for a year at least thereafter on engagements entered into in October, 1915, and those who owned or controlled transportation to such an extent that they could accept regular deliveries f.o.b. vessel.

In this way about all the coal that could easily be freighted had already been arranged for in January or soon after, and unless there should be additional bottoms either from off the Lakes or newly launched, the Pocahontas and New River agencies would hardly be in position to take additional business on delivered prices. A few steamers were brought from the Lakes and together with scattering barges and schooners, they carried about all the smokeless coal that was "free" for the open market and subject to price movement.

The quota in the hands of Eastern distributors to be freighted in their own boats was of course considerable, but only a fraction was unsold early, and such volume as there was played its part in the on-car market at Boston, Providence and Portland, and had no bearing on returns at first hands.

Unsatisfactory Conditions at the Opening

With these points in mind, it is easy to understand why the f.o.b. market was apparently so sluggish to July 1. Aside from export business, there was relatively very little coal for current sale; but even if output had been greatly in excess, the shippers would not have been able to sell in proportion because there were not enough boats to take it away. It is of course probable that a good-sized Government order in March or April would have been eagerly sought, but when production began to be curtailed it was realized that the bulk of it had already been disposed of.

Prices f.o.b. Hampton Roads in 1916, therefore, did not fairly represent the net return on the big volume that was mined; a price curve based on weekly quotations would indicate the yield to the Pocahontas and New River interests on only a small percentage of their output. Hampton Roads figures in 1916 were much less significant than in the years when business was taken on prices named in the spring.

It was a trying year for agencies and operators alike, although much of it could have been foreseen. For half the year there was difficulty moving the output and for the second half the struggle was to get the output to the ships. Aside, therefore, from a few smaller agencies that were in position most of the year to reap handsome profits, the Pocahontas and New River producers had little besides trouble for all their pains.

The broad market looked for in January failed to materialize, and only a moderately forced buying kept the $2.85 price from sagging. Then delays set in at the piers, partly on account of heavy tonnages arranged for export during February. For a time the f.o.b. market acquired strength. Foreign bottoms were meeting slow dispatch at Philadelphia and Baltimore and naturally turned to Hampton Roads. Not even a mild flurry resulted, and all through the spring the maximum advance in prices was not over 10c. It developed that New England stocks were not so light as feared, and spot prices moved around from $2.90 down to $2.70 by April. The record of early 1916 is therefore dull and uninteresting.

"New prices" were mentioned in February, but the coal had already been sold and the current market discounted them by a liberal margin. Unless one could be assured transportation there was little use in making contracts. To the relatively small constituency that had boats and yet had orders to place, it was well known that the only reason three- and five-year contracts had not been made in several cases in 1915 was because the buyer, in his wisdom, saw fit to decline the longer term. In the face of that attitude on the part of important shippers, it was naturally hard to line up any considerable tonnage at $3, early in the season.

March came along with its uncertainty of labor conditions in Pennsylvania and the selling interests were frankly in a dilemma. Any advance over 1915 would be certain to postpone buying, and the offerings of smaller agencies that were pressed to release cars only furnished arguments for the consumers to wait. At length, when bad weather had caused irregular movement of boats, these small agencies were eager to shade $2.85 if coal standing could be dumped, but because of high marine freights and the peculiar state of the market there was practically no cargo demand outside of contract.

There was then no trouble whatever about car supply or movement on the Virginia roads. It all formed an odd situation. The very few who were obliged to dip into the market paid high for their boats, but speculative cargoes were an extremely poor sale.

All this time the operators were confronted by a labor problem none too easy to deal with. It was a case of moving coal to keep their men, and the only condition favorable to new business was where buyer or seller controlled marine transportation. In that case coal could be sold and was sold. In April the lowest price named the City of Boston for a six-months' contract was $5.51 alongside, or approximately $2.97 f.o.b. plus $2.50 freight, and insurance.

Early Indications of Shortage

Not until April, when demand came from the Lakes, were there signs of shortened supply at Hampton Roads. Prices were firmer, but it could not be said the coastwise demand had in anywise improved. A fortnight later, about the time the inquiry came for 5,000,000 tons for Europe, receipts diminished, and the railroads began their attempts to conserve car-supply. As usual, consumers and distributors in New England began to stir things, with the object of taking coal to the limit of storage. Others were trying quietly to buy "on the side."

RECEIPTS OF BITUMINOUS COAL BY SEA AT BOSTON, SHOWING PORT OF SHIPMENT*

	Baltimore†		Norfolk‡		Newport News		Philadelphia		New York		Totals		Foreign§	
	1915	1916	1915	1916	1915	1916	1915	1916	1915	1916	1915	1916	1915	1916
January	124,992	43,975	210,172	285,416	50,311	113,052	22,633	29,123	.....	.....	408,108	471,566	45,083	49,528
February	107,439	65,552	193,027	230,252	52,062	48,997	49,974	16,715	.....	.....	402,502	361,516	48,379	32,293
March	122,733	50,316	253,994	257,905	49,676	80,707	54,540	22,662	.....	714	480,943	412,304	41,166	31,247
April	108,744	67,398	181,847	265,840	27,100	83,535	35,989	36,517	.....	2,725	353,680	456,015	55,785	42,936
May	90,633	82,299	211,326	233,586	75,402	100,039	36,769	22,615	.....	.....	414,130	438,539	27,118	10,882
June	81,565	64,756	94,903	260,610	40,002	75,777	28,709	27,079	.....	1,550	360,694	429,772	19,538	15,375
July	88,704	95,679	177,923	205,107	30,620	79,604	31,493	19,099	.....	3,879	328,740	403,368	20,086	27,345
August	84,258	81,018	184,128	264,165	77,033	80,471	18,168	23,547	6,732	.....	370,319	449,201	27,798	28,721
September	92,138	82,984	191,293	249,397	44,864	39,115	45,941	18,627	8,873	5,250	383,109	395,373	27,946	26,409
October	95,736	76,897	204,192	213,924	87,284	34,387	23,321	23,382	4,400	2,851	414,933	361,441	34,599	24,865
November	97,459	67,777	126,967	199,364	82,400	48,306	28,618	23,077	2,200	9,582	337,644	354,886‖	20,081	27,655
December	78,030	57,404	182,758	187,619	64,175	89,990	27,772	25,352	2,399	16,341	355,510	376,706	73,036	27,536
Totals 1916		836,055		2,853,185		873,980		287,795		52,892		4,910,687		344,792
1915		1,172,431		2,212,530		680,929		403,927		24,604		4,610,312		440,615
1914		1,158,266		2,637,632		611,369		456,446		3,095		4,866,778		258,647
1913		1,164,514		2,485,679		737,647		553,573		3,274		4,944,687		269,659
1912		1,361,994		1,836,750		945,803		322,334		9,639		4,465,520		309,106
1911		1,576,397		1,218,391		921,220		381,961		3,776		4,101,745		263,861
1910		1,595,554		795,475		1,243,857		292,636		25,515		3,954,251		296,564
1903		481,111		314,505		596,439		595,824		93,940		2,081,819		1,226,134

* Courtesy of the Boston Chamber of Commerce, Statistics Department. † Includes small shipments from Washington and Georgetown, D. C. ‡ Lamberts Point and Sewalls Point. § Almost exclusively from Louisburg, Cape Breton, except during 1903, when a large tonnage came from Great Britain to relieve shortage because of strike. ‖ Includes one cargo, 6,780 tons, from Charleston, S. C.

Rumors of labor complications in the Pittsburgh and Fairmont districts stiffened the shippers in their determination not to name prices for more than a month or two ahead. The first three months of 1916 output had been heavy, and a car shortage was now all the more seriously felt. It was in deference to a feeling of unrest that the United States Coal and Coke Co. in the Pocahontas field gave an advance to their miners.

In still another few weeks the situation was reversed; accumulations appeared at Norfolk, New England resumed its policy of "wait and see," and concessions were again made to factors with boats in hand. It was in this May period of temporary slump that the United States Navy Department was able to buy 150,000 tons for the year ending June 30, 1917, at $2.58 f.o.b., 240,000 tons at $2.69, and 200,000 tons at $2.80. In all 750,000 tons of Pocahontas and New River was bought at an average price per ton of $2.73 plus. That gives a fair indication of the coastwise market at that stage.

There was, however, a growing feeling that coal would be hard to get. Exports were increasing by leaps and bounds. Only once after Mar. 11 did weekly dumpings fall below the 300,000-ton mark, and the way was paved for the first week in August, when the three railroads attained a gross tonnage of 415,389 tons, the first time they had crossed the 400,000-ton mark.

Quotations were again fairly firm at $2.85. Colliers to New England made regular trips and tows moved satisfactorily. At the same time stocks in that territory were not large and nearly every shipper was behind on his obligations. Some of the factors filled in with barges when they could be had. Tonnage brought from off the Lakes proved a disappointment. Any sizable spot market was fast being eliminated; shippers were beginning to hold themselves down to offshore and coastwise commitments, and together they accounted for an unusually large percentage of current output. Those consumers in New England without contracts were now powerless to protect themselves against whatever rates might rule in the fall.

The Turn in Pocahontas and New River

By July 15 there was a real shortage. The mining regions began to feel the lack of men as in other fields; the agencies were forced to decline boats offered on contract, and in a small way there was initiated the practice of large shippers buying small tonnages of rival houses and paying the spot price. Only a little extra impetus was wanting to send quotations above $2.90. Eastern consumers were complacent until they found stocks getting light. There was no way of adding to transportation, the shortage of which was the real root of most of the difficulty. Purchasers who for years had favored Georges Creek and the Pennsylvania grades found that the situation was general and not local.

The turning point in the seaboard market came with the floods in West Virginia. The trade has then given a chance to see how closely demand had caught up with output. Steamer arrangements were upset for a week and few were in position to promise dispatch. Through a frantic desire to clear ships prices were bid up to $3.15 and would have gone higher had there been any more coal. Three to five days were taken to load, charterers dependent upon quick loading were anxious, re-orders came from abroad, and in a month's time the long-awaited upward trend had arrived. Spot prices were $3.25, and only a few could make quotations at all. Deliveries were closely held down to contracts, leaving current demand to be supplied elsewhere, and shippers got increasingly shy of the rigid loading guarantees that had been the rule.

The price quickly rose from $3.25 to $3.50. Every consignee hammered his shipper, but there was no very active spot market. The discrepancy between current and contract prices and the fact that deliveries were perhaps not over a month behind on the average prevented even a near panic.

Some Typical High Prices

At this juncture the Government came into the market for 500,000 to 600,000 tons for the Panama R.R. for the year ending Sept. 15, 1917. In all a total of 630,000 tons only was tendered, the highest price $3.50 and the lowest $3.40 f.o.b. Hampton Roads, and the management was practically under compulsion to accept all the bids. The average price per ton was $3.46 plus, or 73c. higher than was secured for the Navy Department only three months or so earlier. The market was now definitely committed to high prices the balance of the year.

In September the threatened railway strike caused steamers at New England ports to be rushed back for loading, and cases where four or five shippers furnished coal to make up a cargo were not exceptional. Charterers of transportation originally intended for Philadelphia and Baltimore were embarrassed to find so little chance of loading at Hampton Roads.

RECEIPTS OF ANTHRACITE COAL BY SEA AT BOSTON

	From Philadelphia		From New York Ports		Totals	
	1915	1916	1915	1916	1915	1916
January....	44,754	55,461	72,030	68,526	116,784	123,987
February...	17,463	44,734	47,238	44,191	64,701	88,925
March.....	32,373	44,673	83,899	73,110	116,272	117,783
April.....	35,674	64,678	69,670	113,583	105,344	178,261
May.....	54,872	39,187	117,531	106,017	172,358	145,204
June.....	43,657	45,555	90,828	94,749	134,485	140,304
July.....	59,298	45,802	71,871	93,862	131,169	139,664
August.....	57,912	40,033	77,977	96,588	135,889	136,621
September..	55,421	35,387	91,262	85,599	146,683	120,986
October....	48,953	45,605	94,661	74,989	143,614	120,594
November..	48,750	34,713	74,482	58,345	123,232	93,058
December..	49,612	28,392	69,822	47,117	119,434	75,509
Totals 1916.		524,220		956,676		1,480,896
1915.		548,689		960,331		1,509,960
1914.		624,798		1,094,241		1,719,099
1913.		582,183		1,094,128		1,676,311
1912.		579,778		1,054,378		1,554,156

Meanwhile, spot prices were on the climb, $4.50 being paid by Sept. 30. Shippers were under engagement to load more tonnage than current mining could justify. The City of Boston, inviting bids for 19,000 tons alongside, got one proposal—$6.48—which was $3 higher than in 1914. For New England, dependent in such large measure upon regular weekly trips of colliers, the delays in loading had a serious aspect. More than one factor sought to protect himself by purchases of other grades and an occasional market cargo from Hampton Roads. The buyers who had deliberately set out to overbuy were now getting just about enough to keep them running.

October and November saw the acute conditions only accentuated. Output was inadequate for the abnormal demand created by export and bunker business, and partly by the shortage of other coals. Had there been more confidence in the stability of marine freights there might have been an active interest in speculative coal. As it was, the opportunity to lose fifty cents to a dollar a ton was an ever-present possibility and, besides, the market was not broad enough. The great anxiety of shippers

themselves to get the coal necessary to clear steamers accounted for much of the spot selling, a steady progression from $5 late in October to a range of $7@8 in November. Prices held at that level f.o.b. to the end of the year.

In November it was announced that the bunker price for the calendar year 1917 would be $5 plus trimming. The 1916 basis was $3.10. This considerable advance was significant to consumers interested in the contract basis for cargo coal coastwise. What price shall be "asked" was not settled, but there was a disposition to seek a $4 basis, and to secure an understanding that Jan. 1 and not Apr. 1 should open the contract year.

Inland Distribution

On-car prices at Boston and other New England ports were governed first by the high level of water freights and second by the fluctuating state of the all-rail market. Current quotations nowadays are not so informing as when these markets were open to a large number of shippers who sold or not as they pleased.

In these piping times interests that were far-sighted enough to equip with modern wharves where large steamer cargoes could be regularly received and forwarded have gradually absorbed the tonnage, until in 1916 there was room only for an occasional speculator, and then only because the factor on the ground either could not or did not choose fully to supply the trade.

At the beginning of the year the distributors with "free" coal were in position to get remunerative prices. The figure on cars Boston or Providence was $7, and there it hung until the whole market eased off in February.

Another element in prices was the generally slow movement all-rail and the frequent cases of bad congestion which invited intermittent embargoes by lines connecting with the coal fields. A great lack of motive power seemed to be characteristic of the New England railroads throughout the year, although for two months in the summer there was real improvement. Certainly at other times there were startling tales of empty cars lying idle and small factories here and there shut down for want of fuel.

By the end of May on-car quotations had been modified to about $5 at all the distributing ports and a relatively small volume of season business was contracted for on that basis. The re-handlers, however, were not without their troubles. Besides the uncertainty of cargo arrivals they had to contend with poor car service. There were times when a larger tonnage would have swamped the railroads hauling inland. Of course many of the conditions followed closely those of the coastwise trade as a whole, but it can be said that until September the price movement was less than it was f.o.b. A few confident wholesalers undertook to guarantee deliveries to points within 50 miles of Tidewater by promising water coal in case all-rail service failed.

The value of ample storage was appreciated in 1916 as never before. With so large a proportion of New England contracts placed at delivered prices for a yearly term, we are not likely again to see the broad wide-open markets that were occasional features some years ago.

Spot prices gained momentum; now and then a high-priced cargo was bought, but mostly the purchases were of small lots. At the end of October $7 was again the current quotation f.o.b. Providence, and by December $9.50 was the figure most often heard on Pocahontas and New River.

The summary is, as in the case of coal f.o.b., that the biggest volume of contract business had been closed, or at least secured, in 1915; and so far as concerned active canvassing for orders, 1916 was like an innocent bystander!

Georges Creek Coals

The output of Georges Creek figured less in the coastwise market in 1916 than in any other year under modern conditions. The chief Maryland shippers had been involved in the October, 1915, competition for 1916-1917 contracts on cars and alongside in New England, in order, as they said, to retain their tonnage; and all the year they were so hampered by car and labor shortage and the slow movement of boats that for weeks at a time their receipts at Boston were almost negligible.

The coal has always been popular in this market, although latterly in a restricted sense, but it now seems inevitable from the experience of 1915 and 1916 that shipments to this territory will be further reduced as the years go on. During the whole twelve months there was practically no spot Georges Creek available at any point, aside from dribbling quantities that emanated from the smaller and less favorably known operations. What deliveries were made were almost exclusively applied to contracts, and that the percentage was so small is the reason Georges Creek was so great a disappointment coastwise in 1916.

Early in the year, on account of slow loading at Baltimore, the owners of Georges Creek transportation had established the practice of using Hampton Roads as an emergency or reserve station where bottoms could be loaded promptly. Liberal quantities of Pocahontas and New River were bought for this purpose, and at different periods—until Hampton Roads prices had soared above $5 and purchases had all been taken—these coals were regularly received on Georges Creek contracts. In fact, many of the contracts as drawn gave the shipper that option, care being used to ship only low volatiles.

Georges Creek Prices

The principal Georges Creek shippers have always had the advantage of a considerable fleet of steamers, tugs and barges, but several units were either sold or lost at sea in 1916 and with the unfavorable weather during the spring and early summer the distributing offices faced a very embarrassing and uncomfortable situation. In some cases as early as in March barges that had waited at Baltimore were towed light to Norfolk or Newport News to load.

Notwithstanding the volume of coal previously sold through depots and their own agencies, season contract prices were announced in March. The new quotations were based on $3 f.o.b. Baltimore and $2 f.o.b. mines, an advance in one case of 15c. and at the mines of 33c. over the figures for 1915-1916. Delivered prices were made on the basis of $1@1.10 freights to Boston points, dependence probably being placed upon the stability or weakness of spot prices at Hampton Roads. That, however, proved a poor reed, and by July, being then in arrears on important contracts, certain of the Georges Creek interests found themselves without any adequate source of supply. They were short of coal and short of

boats. More than once the colliers "Franklin" and "Plymouth," engaged in regular trips to Cairo, Egypt, were taken for coastwise trips in between, in the effort to make up the more glaring shortages in New England.

The general result was a pronounced dearth the season long. Even to holders of contracts there was practically none available f.o.b. Philadelphia or New York. It was a continuous struggle to keep pacified those who had the coal due them. Such supplies as there were came forward intermittently, and by November bottoms waited at Baltimore a week and ten days to load. In effect, at the end of the year, Georges Creek had disappeared from the coastwise market, the attempt being made to make up the arrears by shipping other coals. Certainly it was a disastrous result of the 1915 competition and a general policy of taking on too much business.

F.o.b. Philadelphia the season contract price was $3.07 @3.17, and at New York, $3.37@3.47.

The Pennsylvania Grades

Sustained irregularity was particularly characteristic of the Pennsylvania steam varieties in 1916. Aside from a few shippers who had access to marine transportation, the inclination of the producing interests was to keep out of the Tidewater market. Car-supply was so unreliable that they depended more than ever on the line, all-rail and Lake trade to place the greater share of their output. Shortage of miners also had to be reckoned with, but mine owners who were in position to pay more wages did pay, in most part, and reaped a remunerative return in prices. These were usually the interests that had not developed a regular trade and were therefore not hampered by the distribution of cars.

Shippers of Cambrias who in 1915 had competed vigorously for offshore and Government business made no conspicuous effort in 1916. Rather, it seemed, they measured the prospect early in the year and decided upon tonnage that would tend to give better movement.

Prices on the Pennsylvania Grades

The year opened with Clearfields ranging from $2.50 @3.25 f.o.b. mines and Cambrias and Somersets at $2.85 @3.40. It was characteristic of the steam market to show an unusually wide range of prices most of the year. Quotations depended upon local conditions with seller as well as buyer, and when prices are uneven there is an opening for bargains. A lot of in-and-out buying helped along the practice. In January all-rail movement was poor; shipments in November were still en route, and yet the tonnage was heavy, largely because of the shortage of boats coastwise. Official figures showed an increase in January of 55 per cent. via transfer points to the B. & M. and B. & A. roads as compared with the same month in 1915.

Late in January embargoes were lifted, coal in transit softened 25@50c., and again it was realized that there is nothing like high prices to increase output, or low prices to diminish it. Early in the month centers like Waterbury, Conn., and Providence, R. I., were using autotrucks to supplant railroad deliveries, but by February the trend was well toward normal prices plus the wage advances made during the stringency.

Labor uncertainties and intermittent embargoes against New England railroads were not favorable to a heavy volume of contract business, and for two or three months there was temporizing at both ends. Dispatch at Tidewater was equally undependable. A surplus of loaded cars drove prices down to $1.45@2 for Clearfields and to $1.60@2.15 for Cambrias and Somersets.

By March 1 there were attempts to sell for season delivery, subject to a mining clause which it was thought would mean 8@10c. Apparently there was much confidence among producers that the market would stand 25@30c. more than in 1915, but Hampton Roads coals always set the pace, and so large a tonnage from there had already been sold at low prices it was hard to see how buyers could respond. All-rail territory was actively canvassed on the basis of $1.35@1.75 for Clearfields, the higher grades $1.55@2, but results were meager.

Later, the agencies modified their ideas as they came to understand the state of trade and the sentiments of buyers and very little new business was actually closed until the season had advanced. At Tidewater, too, the Pennsylvania shipper was at a disadvantage, for lack of transportation under control either of buyer or seller.

Prices fluctuated in April over news from the wage conferences, but when agreements had been reached, effective for two years, most difficulties except shortage of men were gradually ironed out, and minimum prices were down to $1 and $1.30, for Clearfield, Cambrias and Somersets. For the quality grades there developed an ample market in the iron and steel regions, and it was seen that New England consignees would not figure so largely as usual. At Tidewater there was wholesome dread of yearly contracts over the piers. Railroad fuel supplies were arranged all-rail to greater degree than ever.

The Firm Closing Period

The turn came in July, although from then on for two or three months the price movement was only gradual. Operators had all the business they cared for, movement was restricted by rulings of New England railroads as to the amount of traffic they could accept, and premiums were asked for deferred deliveries on new sales, partly in consequence of the slowing up at Hampton Roads. By October there was real trouble over cars, and all grades were selling up to $2. Cambrias and Somersets, in most cases, were curtailed to what cars could be had on contract obligations, and never was it harder to get boats and coal together at Tidewater. Nov. 1 saw $4.50 f.o.b. mines for ordinary steam grades and $7 alongside Boston. It was not so much a case of New England buyers losing their heads as a genuine shortage of railroad equipment to supply urgent needs. Spot prices, though, were chiefly confined to small factors.

Requirements for New England plants were greater than anticipated, and with interruptions general prices were run up to $6.50@7. Later still came a sag, from which the market very shortly recovered, although the recovery was more conservative than the first flurry. For a few days $6.50 was again reached and held, but by Dec. 15, $5.50 was nearer the current basis. Such high levels were reached that few operators eventually were proof against them, and whether output had been sold or not, there was bound to be "free" coal in almost every direction.

Not even in 1902 was there so long a period of high prices. That was the leading feature of the Pennsylvania grades as well as those in West Virginia during the trying months of 1916.

The Anthracite Industry in 1916

SYNOPSIS—Year opened with increased prices and a strong demand. Uncertainties as to a wage agreement Apr. 1 caused a mixed situation during the first quarter. Early indications of a shortage were fully substantiated, hysterical buying developing in the fall with premiums of $3 to $4 a ton. Wage agreement fixed until 1920. Government interferes with the fixing of a new circular. Investigation of anthracite prices. State tax refunded.

The year 1916 opened with all producing interests announcing increased circular prices. This increase really represented the amount formerly charged as a special item on account of the Pennsylvania State tax of 2½ per cent. on the price of the coal at the mines, but the companies now stated they would no longer charge their customers with this tax. As there was no chance of receiving a refund, as had formerly been the case, the retail dealers in many sections of the country increased the prices of coal to their customers, the increase amounting to as much as 25c. a ton in some sections.

Coal was in strong demand at this time and with the arrival of real cold weather the shippers were swamped with orders. The expiration of the agreement with the miners on Apr. 1 began to loom up as a menace to the trade, and everyone began buying heavily in anticipation of trouble at that time. The prices of steam coal also advanced rapidly, often bringing as much as 75c. to $1 above circular. Shipments were greatly hampered, too, by a shortage of cars.

Much interest was shown at this time as to the attitude the big companies would take on the subject of contracts, most of which had expired on Dec. 31. Heretofore the custom had been to contract for the entire year from Jan. 1, but with Apr. 1 coming it was felt that a change would be made. The operators finally decided to contract only for the first three months of the year.

In February much of the activity of the preceding month vanished, on account of the changeable weather conditions. The dealers took advantage of the situation to replenish their stocks, which had been well nigh depleted. Premium coal at this time disappeared completely. The trade was anxious also to lay in heavy stocks, on account of the threatened labor trouble at the mines, but many railroad embargoes made this difficult of accomplishment.

Expiring Wage Agreement Causes Uncertainties

March still found the trade waiting for seasonable weather, with most interests reporting good stocks on hand. None of the sizes were in active demand except pea, and most companies found it difficult to keep up with the orders on this size. The buyers were placed in a difficult position, for with the first of April near, no one was certain as to the best course to pursue. If the miners should work, and the customary April or spring discount become effective, then no one wanted to have a stock of high-priced coal on hand. On the other hand, if mining was suspended, then every one needed all the coal possible.

Users of steam coal under contract were also anxious as to what would be their position after Apr. 1. Production fell off heavily, as many of the miners, disturbed by the uncertain conditions and attracted by the high wages offered in munition plants throughout the country, began to leave the mines. Orders finally became so scarce that collieries were compelled to shut down, and what was usually one of the busiest months of the year actually became the dullest. In order to keep their plants going some of the producers began selling their product subject to whatever price might be fixed upon later in the month.

In the meantime the miners and the operators had been in session over a new agreement, and at the beginning of May the conference gave every indication of becoming a deadlock, with the consequence that there was again an extremely heavy demand for coal. But a new agreement was reached suddenly, almost without warning, and cancellations of orders followed quickly. After a long wait a new price circular was finally issued, which as a matter of fact was one of the causes of the general apathy of the trade in buying.

The first summer weather in June found prices being cut right and left, with but small business resulting. The general public seemed to have lost interest in their coal supply. For the time being a large proportion of this trade was lost, and short working time in the region became of common occurrence. In addition the application of the terms of the new working scale caused many disagreements, which resulted in many local strikes. Coal also began to come in at this time rather poorly prepared, seeming to lend credence to the rumor of the change in sizes. Furthermore, the operators had increased the prices of steam coal and the manufacturing interests were somewhat loath to close at the new figures. The contract period was also changed to date one year from Apr. 1.

The Turning Point in the Trade

Toward the latter part of the month business began to show some improvement, as the short working time at the collieries began to affect deliveries, so that with the arrival of July the market had perceptibly stiffened. While there was still some little price cutting, the tendency seemed to point to the complete elimination of that feature in a very short time. The car shortage continued to retard shipments. The retail men, most of whom had delayed stocking in anticipation of a break in prices, now began to realize their error and commenced to take in this size as rapidly as possible.

Business improved so much that toward the end of the month production was only keeping up with the demand, a most unusual situation for this time of the year. The month of August found an even stronger demand setting in. With the mines working near full capacity, the absorption of the output was complete. At this time the Anthracite Bureau of Information issued an interesting statement suggesting a possible shortage of fuel during the coming winter and urging all consumers to

put in their winter's supply during the summer. The wholesale demand was brisk, but the retail trade paid little attention to the warning. The threatened strike of the railway trainmen set for Sept. 1 also spurred the dealers to renewed stocking.

In September the full circular prices took effect, and as customary the discount was decreased 10c. each month until the price again became normal. The retail trade began to show activity and the wholesale trade grew correspondingly stronger. Shipments were slow, on account of labor shortage and the poor car supply. The demand for stove and pea coal was exceptionally strong, and premium prices for almost all sizes were offered in New England.

Fall Trade Very Active

October brought with it the first cool weather of the season and the demand for coal became heavy. All the companies endeavored to operate to the fullest capacity, but were much retarded by repeated "button" strikes. A strong demand for fuel set in from the West and coal was freely sold there at a premium of $1 above the circular. With the rapidly advancing prices of bituminous the anthracite steam coals also strengthened. Toward the middle of the month the trade became panicky, particularly in New York and New England, and premium figures of $1 to $1.50 became quite common.

In the West the demand became so strong that big calls for pea coal came in, a size but little used there, which considerably interfered with the supply of this size in the East, especially since largely increased prices were being paid for it. Collections on the part of the wholesaler, which had practically caused no annoyance all summer, really became of no moment at all. It was simply a case of getting coal, as every retail man seemed to have the money and was extremely anxious to exchange it for coal. The demand became so strong before the month closed that the operating and sales companies called in their salesmen.

November found the buyers hysterical, with purchasers both East and West paying $3 and $4 premium. The rush for fuel now resembled the stirring strike times of 1902. The big companies drew on their storage stocks months sooner than expected, and the reserves were rapidly depleted. Before the close of the month, however, the situation began to tone down everywhere. An exceptionally strong demand still existed for every ton of coal mined, but the market seemed to regain its composure. As a consequence of this calming down the premium prices receded as much as $2 and $3 a ton.

Extremely mild weather occurring in the early part of December, the market lost much of its excitement of the previous weeks, although stocks continued very low and dealers made every effort to get additional supplies. This caused slight premiums to remain in effect.

About the middle of the month real winter weather pervaded the entire coal-consuming territory and prices once more began to mount, although at no time did they reach the point touched during the fall. There was no actual shortage, but supplies were extremely short at all times and the prediction was made that January would witness the biggest demand yet for coal, as the stocks in the cellars began to show exhaustion.

In the Philadelphia territory all the dealers in the latter part of the month increased the retail prices 25c. a ton, and so anxious was the general public to get fuel that it hardly created a ripple of excitement. More premium coal was offered for sale at this time than during any other period of the season, although the highest premium did not appear to be in excess of $1.25, with many sales much less than that.

The New Working Agreement

After much parleying the officers of the miners' union met a committee of the operators in New York City on Feb. 10 to arrange a new working agreement. The labor forces were headed by John P. White, president of the United Mine Workers of America. The principal demand was for a 20 per cent. increase in wages, an eight-hour working day and recognition of the union.

In the meantime the mine operators had entered upon one of the most remarkable publicity campaigns in the history of American industrial life. Whole pages were used in the newspapers throughout the anthracite consuming sections of the United States in an appeal to the judgment and good will of the public. One of the significant features of this campaign was an extensive statement detailing in minute form the exact cost of mining and the profit accruing to the operating companies.

At the first meeting each item of the tentative demand presented by the miners was taken up separately and rejected, and for a time a deadlock seemed imminent. The meeting adjourned without any time being set for another conference. However, as the first of April approached, the miners' leaders ordered the men to remain at work until a new agreement was reached and as a consequence the operators went into another conference.

It was generally admitted that the miners were entitled to an increased wage, but the principal contentions were the eight-hour working day and the recognition of the union. When the entire proceeding seemed about to result in failure, light was shed on the difficulty by the operators on Apr. 30 submitting a proposition, in which they practically agreed to all the miners asked, except the rate of increase in wages. They agreed to accept the eight-hour day, which meant a wage increase range of from 3 to 15.9 per cent., and also agreed to recognize the union.

The union officials submitted the proposition to a convention of the union delegates and the agreement was finally signed by both the union officers and the representatives of the operators on May 4, to continue until April, 1920.

Almost from the moment the new agreement went into effect a great deal of dissatisfaction was displayed on the part of the miners, as there seemed to be a lack of unity as to the interpretation of the different clauses. It was also soon perceived that the production of the eight-hour day was far from keeping pace with that of the longer day.

New Price Circular

Immediately after the signing of the new working agreement the operators met in conference to decide on a new price circular. While this at first appeared to be merely a matter of routine, it soon developed greater difficulties, if possible, than had the agreement with the miners. There seemed to be an entire lack of a guiding spirit in the deliberations.

Late in the month of May a circular was finally agreed upon, then suddenly the information was spread broad-

cast that the Government officials at Washington were closely watching the proceedings. The statement was plainly made that they were making an investigation and preparing to take legal action if it could be established that the operators were in collusion in naming prices. This completely upset the plans for a new circular and the one tentatively agreed upon was abandoned in its entirety.

It was then announced that each company would name its own prices regardless of the others. The first company to issue a circular was the Philadelphia & Reading Coal and Iron Co., and when it came out it was found to be practically the same as the one given out originally by the joint conference. The other operating companies, following the precedent of many years, soon followed the Reading's lead and adopted the same selling figures.

With the general price circular out of the way interest next centered on the question of contract prices to take the place of the contracts which expired on Apr. 30. In the meantime shipments had been made to all contract customers subject to whatever prices might be agreed upon later. Toward the end of May the figures were given out.

Interest in the new figures was almost completely overshadowed by the announcement of a new steam size to be known as "boiler" fuel. This size was placed between rice and barley, with a price of 10c. less than rice, and was supposed to contain 60 per cent. rice and 40 per cent. barley. Another distinct innovation was the changing of the contract season from Jan. 1 to the year beginning Apr. 1, which corresponds to the system of making bituminous contracts in vogue for many years.

Prices Increased Momentarily

Toward the close of October a well defined rumor became current that the anthracite circular prices were to be changed. This was given considerable credence because of the fact that one of the larger companies in taking orders for stove size would not guarantee the price beyond the month in which the order was accepted. The actual practice had been to guarantee the price until shipment was made after the winter circular became effective. It was thought that the change was being considered on account of the extraordinary demand for stove size.

On Nov. 1 some prices were actually increased, but the only domestic size affected was pea coal, which in the Philadelphia territory, for instance, was increased from $2.80 to $3; in addition all the steam prices were also increased. These prices were announced as being for new business only, but the company adopting them soon learned that the trade was eager to get the coal at practically any price and large tonnages were at once closed at the new figures. At New York the price increases were 15c. on pea coal, with 10c. on egg, stove and nut; on the steam sizes Nos. 1 and 2 buckwheat was increased 25c. and No. 3, 20c.

A remarkable sequel to these price increases resulted in Philadelphia. It appears that the new prices were given out only a week before the Anthracite Price Commission unexpectedly announced that it would hold another session in that city, and just a few days previous to its convening there the new $3 price on pea coal was rescinded and placed at the old figure of $2.80, much to the jubilation of those who had ordered heavily at the new figure. In all the previous inquiries of the commission it had devoted its attention exclusively to the domestic sizes of anthracite, and this probably explains why the new figures for the steam sizes went on without change.

Anthracite Price Commission

When the first anthracite tax act of 1913, which imposed a tax of 2½ per cent., went into effect, there was some complaint that the retail prices had been increased. At the next session of the state legislature a commission was created for the purpose of ascertaining if the retail men had taken advantage of the situation and passed the tax on to the public. The commission was to consist of three members, without salary, but $5000 was appropriated for expenses.

The Governor of Pennsylvania appointed this commission on Jan. 1, but as several appointees declined, it was not until July 1 that it got under way with its investigation. In selecting the members the Governor for some reason failed to choose any one who had a particular knowledge of the coal business. The commission at this time showed a disposition to conduct its work with as little expense and energy as possible, and formulated a letter with a long list of questions, which it sent to all the retail coal dealers. Many of the questions were so pointed in their inquiry into the personal affairs of the retail men that it actually seemed to be an invasion of their private rights should they be compelled to answer them.

The dealers almost to a unit declined to reply, although there were a few exceptions, steadily maintaining that they did not increase the price of coal as a result of the tax and actually welcoming an investigation, so that they could place their case fairly before the public.

Finally, on Sept. 7, the commission adopted a new plan and convened at Philadelphia. Many of the prominent retailers attended and convincingly showed that they were actually doing business on a smaller margin than the dealers in any other part of the country. Later the commission held meetings at Scranton, on Sept. 27 and 28, and at Wilkes-Barre on Sept. 29, and in the latter part of November another meeting was held in Philadelphia, at which the prominent officials of the larger mining companies testified. An additional session was also held at Harrisburg on Dec. 1.

The commission was to report to the Governor on Jan. 1, 1917, and its report will be awaited with much interest.

The State Tax

The Supreme Court having declared the tax act of 1913 unconstitutional, the mining companies began preparations for the refund of the money collected by them from the dealers. The first to ask for the refund was the Philadelphia & Reading Coal and Iron Co., which began in March to ask the larger dealers to present bills covering the tax charged them on shipments of coal from July, 1913, to May 31, 1915. The return was not made in cash, but was credited to each customer's account and taken up in payment for purchases of coal.

As several of the larger operating companies had not actually charged their customers with the tax as a separate item, much concern was manifested as to whether they would make a return. However, after a rather long delay, even these companies asked for bills and began to send out credit vouchers to their customers. The tax has not all

been returned yet, but the movement is proceeding quietly and within the next six months it is thought the refund will be completed.

While the act of 1913 was declared void, it must be remembered that the legislature passed a new act which became effective on July 1, 1915. It was thought that this later law remedied all the defects discovered in the older act, but the new act too is now believed to have no more force than the original law, and it is probable that no effort will ever be made to collect the tax under it. No one seems to show any disposition to test this 1915 act in the courts, and as the proceedings in the first case were quite expensive to the coal companies that forced the test, it is altogether unlikely that they will take any action looking to the voiding of the 1915 act.

In the meantime the tax collected on shipments between July 1, 1915, and Dec. 31, 1915, at which time the companies ceased charging the tax, will remain in the hands of the coal companies, unless some action is taken to bring a test suit for recovery.

Reduction of Freight Rates

Buyers of coal in the State of Pennsylvania have looked vainly all the year for a decision on the ruling of the Public Service Commission, which ordered a reduction of 40c. per ton in freight rates. This order was issued over two years ago, since which time the matter has dragged along without any action being taken. The matter should now come up for a speedy decision, and if the Public Service Commission is finally sustained, coal buyers will receive quite a large amount of money for the return of which the railway companies are bonded.

But even if this decision is favorable, it is thought that it will only be the beginning of additional litigation, as the transportation companies will certainly not acquiesce until the matter has been passed upon by the higher courts. In addition the question has arisen as to whether a complete refund will ever take place, as the bonds of the companies guaranteeing the return are much less than the total amount to be refunded, which is growing every day.

Change of Sizes

For many years it has been admitted that the anthracite trade was laboring under a disadvantage, on account of the burden of too many domestic sizes. The expedient of shifting prices from one size to the other had been tried without avail, until those most concerned have come to the conclusion that the elimination of one or more sizes would prove to be the only effective remedy.

While often talked of, no definite action was taken until this year. Rumors of an impending change were prevalent all year, one of the most persistent being that the change would be made following the issuance of the new price circular after the signing of the agreement with the miners. When that failed to eventuate there was quiet for a while, but late in the spring the rumor became once more persistent that the large companies had decided to combine egg and stove sizes to make a new grade to be known as "furnace," and another new size to be called "range," made by combining nut and pea coal, and that the latter would be abolished entirely. The retail men became so certain of the change that they actually advised their customers to stock up on such of the old sizes as they were desirous of having for another season.

Following this report, after much agitation against the abolishing of pea coal, it was stated that still another new size to be known as "steam" would be introduced, this being a combination of pea and buckwheat coal. In June complaints began to be heard from dealers of the poor sizing of domestic coal, and it was then found that the new sizing was being introduced. The shipments it seems were made by several of the larger individual companies, but they only lasted a short time. It was later learned that the newly formed association of individual operators had all agreed to introduce the new sizes, but after a week's experience it was found that most of them had failed to keep faith and the new sizing was abandoned forthwith.

Legal Developments

As usual, the anthracite business continues to be involved in many legal controversies, though the questions passed upon this past year were of less importance than those of other years.

Probably the greatest interest has been manifested in the latest moves of the Government to divorce the various anthracite carrying roads from their interests in the coal lands. On Sept. 22 Attorney General Gregory filed a brief in the United States Supreme Court appealing from the decision of the United States District Court of eastern Pennsylvania dismissing the suit brought to dissolve the connection between the Lehigh Valley R.R., the Lehigh Valley Coal Co. and the Lehigh Valley Coal Sales Co. Previous to this an appeal had been filed against the Philadelphia & Reading Ry. in the suit brought to divorce that company from the Lehigh & Wilkes-Barre Coal Co. and the Central Railroad of New Jersey.

In October the Philadelphia & Reading Ry. and the Central Railroad of New Jersey filed a brief stating that the two companies only controlled 20 per cent. of the coal they were accused of monopolizing. On behalf of the Lehigh Valley R.R. that company stated it was only interested in 10.3 per cent. of the total coal lands in the three anthracite basins, and had an interest in but 22.3 per cent. of the coal lands contiguous to the railroad.

The case of the Philadelphia & Reading Ry., indicted for operating a barge line to New England points without having a published tariff, had several hearings in the United States Courts. The indictments against the company were quashed in December, 1914, on account of the presence of a stenographer in the Grand Jury room. Then again on May 27 the Government received a further setback when the case was once more postponed on account of the indictments being improperly drawn.

Another interesting suit was that of the Lehigh Valley R.R., brought to test the powers of the Interstate Commerce Commission, which body on May 7, 1915, ordered the railroad company separated from the Lehigh Valley Transportation Co. This suit was filed Feb. 5, 1916, and on Feb. 12 the court granted a preliminary injunction restraining the commission from enforcing the rule and fixing Mar. 17 as the date for a final hearing. On May 12 the United States District Court dismissed the bill of the Lehigh Valley R.R. and sustained the Interstate Commerce Commission.

On Mar. 16 the Lehigh Coal and Navigation Co. was adjudged guilty of soliciting and receiving rebates from the Central Railroad of New Jersey. The former was

convicted on 27 counts, the fines for which aggregate $540,000. After the court assessed the fines on a number of counts the case was appealed to the higher court.

Workmen's Compensation Act

The compensation law affecting all industrial establishments in the State of Pennsylvania went into effect on Jan. 1 and held particular interest for the mining industry.

In placing the law in operation much friction was encountered, many miners being obsessed with the fear that their wages would be reduced to enable the companies to meet the additional expense. Practically all the companies were exempted by the Compensation Board from taking out private insurance to cover their risks, as they were all able to prove their ability to meet all obligations that might accrue to them.

Probably the greatest difficulty encountered after the cases began to mature was to determine the definition of "daily wage" within the meaning of the act. The Compensation Board finally decided on a plan to meet the situation. They held a hearing on Feb. 26, at which both sides, labor and capital, were represented. Under the guidance of Attorney General Brown the board formulated a rule and stated it was prepared to have this tested by the courts. Later the legality of the act was questioned, and in a test case brought before the Supreme Court at Pittsburgh the law was declared constitutional.

A Year of Prosperity

Despite the fact that the tonnage of coal produced was not commensurate with the needs of the country, due to the shortage of labor and the numerous local strikes, not to mention car shortages and other handicaps to transportation, it is clearly evident that all the mining companies have experienced one of the most profitable periods in their history. The Philadelphia & Reading Coal and Iron Co., for example, shows in its annual report for the fiscal year ended June 30, 1916, that its profit was $1,280,048 as compared with $60,571 the year before. This wide range is particularly interesting because of the fact that despite the enormous business transacted, there has only been one year in its history that has paid a dividend. It is also known that other companies are sharing in the general prosperity to an equal or greater extent.

Anthracite in New England

SYNOPSIS—An abnormal year, with uneven car distribution and constant pressure to get deliveries. Price level much higher after the 4-yr. wage settlement. Retail situation threatened to become acute after September, but a mild November helped materially. Speculators thrived throughout the fall.

Speaking broadly, retail dealers in New England have had no surplus of domestic sizes since early in the fall of 1915. The prolonged summer dullness of that year caused a curtailment of mining from which the Tidewater trade did not recover. It was from the heavy storage piles in Pennsylvania accumulated during that season that relief supplies often came during the stringent periods of 1916. The general lack of forehandedness on the part of consignees the previous year had something to do with the result, and had it not been for the egg, chestnut and pea from this source the coastwise anthracite trade would have been in far worse shape than it was.

As in bituminous, the hard-coal industry underwent disturbance and interruption, all-rail as well as seaboard, and a few operators, mostly the "independents," profited by record prices. The prolonged wage discussion in the spring occasioned a higher level of prices at retail than has been general since 1902-3. Barge rates from New York were advanced by some of the companies, and all told, the hard-coal trade sustained more readjustments in the twelve months just ended than in any like period in fifteen years.

The offer of the miners to work pending wage negotiations eliminated some of the serious aspects of a threatening situation, but the public had been so well prepared for a settlement that the bare uncertainty about "new prices" was enough to keep distributors anxious from January to May. The remaining months made up a record of exasperating delays and increasing apprehension that has been seldom equaled.

Irregular car supply and an abnormal demand were factors in the scarcity of stove and egg, not only in January but during practically all the year. Under these conditions it was not surprising that three or four of the companies regularly shipping east of Cape Cod should incline to direct tonnage to other markets. The largest share of the New England demand fell upon shippers out of Philadelphia who were frankly not in position to handle extra tonnage. It is only by taking five years together that the casual observer can realize the extent to which New York anthracite shippers have withdrawn from New England.

From the first of the year shippers were swamped with orders. Shipments were extremely slow, dock troubles adding to the difficulties. Weather had so interfered with water movement that by borrowing of one another the dealers were just about able to keep going. Larger dealers, in the cities, had deliberately set out the previous fall to get extra shipments, but their small reserves were depleted by the protracted winter.

In April there was anxiety over developments, and looking back now there is no doubt that the more far-sighted consumers did put in extra supplies. With all their anxiety for deliveries the dealers proceeded very cautiously until prices were fixed.

Spring had not advanced far, however, when it was seen the companies were 30 to 60 days behind on their orders. Slow movement all-rail had its effect on Tidewater, and June found every distributor more than insistent upon deliveries. From that time on the situation progressed from bad to worse; pea, chestnut or whatever could be had was acceptable if only a cargo could be put afloat. It was borne in upon the buyer that time lost by slow movement could not be made up. Larger factors sent bituminous transportation to the loading piers to wait for domestic sizes, and in September most of the elements that go to make up a panicky market were present.

The demand from the West and from the Lakes, the confiscation of sizes for engine supply, the heavy drafts for New York and Philadelphia caused added worry. There was delay in the loading of practically every cargo until in November and December barges on current freights, $1.90@2 to Boston, actually waited five and six weeks for cargo, demurrage accruing after six to seven days at the rate of 6c. per ton per day. Stove coal was practically eliminated from this market early in September as far as most retailers were concerned, and deliveries were held down to ½- and 1-ton lots and confined to customers of record. Some dealers having strong connections with old-line companies were forced to pay premiums to "independent" shippers for the first time since 1902. Several were obliged to suspend sales for weeks at a time. Weather was a big factor, and the sudden cold spell in December made the coastwise anthracite situation quite serious.

All-rail movement suffered more or less all the year from intermittent embargoes. In July and August, however, deliveries improved so much that a large number of line dealers were able to take on very comfortable stocks.

Fluctuations in Prices

Among others, the Philadelphia & Reading Coal and Iron Co. announced in January, 1916, that the practice of adding the amount of the Pennsylvania state tax of 2½ per cent. to the price of anthracite would be discontinued, and later in the season many of the shippers refunded the amounts they had collected under the act of June 27, 1913, declared unconstitutional in October, 1915. The January circular, however, advanced domestic sizes 10c. and pea 5c. The steam sizes were up 25c.

It was not until May 16, after the wage settlement, that further changes were made, invoices from May 1 being corrected to the new figures. The usual 40c. reduction was conceded for May shipment and decreasing reductions up to and including August. Broken was advanced 40c., egg 15c., stove 40c. and chestnut 20c. over prices (including tax) in corresponding months in 1915. Pea was added to the sizes advancing month by month until Sept. 1. The new circular had been generally discounted by the trade and there was remarkably little disposition to criticize.

Nov. 1 another new circular was issued. The advance this time was 10c. on broken, egg, stove and chestnut, and 15c. on pea. The following table compares prices on Dec. 31, 1916, with those a year earlier, showing also the amount of the advance.

PRICES F.O.B. VESSEL PORT RICHMOND (PHILADELPHIA) FOR SHIPMENT BEYOND THE CAPES OF THE DELAWARE

White Ash	Dec. 31, 1915 Plus Tax	Dec. 31, 1916	Increase (Approximate)
Broken	$4.25	$4.85	$0.53
Egg	5.00	5.35	.26
Stove	5.00	5.60	.51
Chestnut	5.25	5.65	.30
Pea	3.25	3.85	.55
Buckwheat	2.25	2.65	.37
Rice	1.70	2.15	.42
Boiler	....	2.00	....
Barley	1.45*	1.90	.43

* No tax added to this size.

To the above prices 75c. water freight to Boston is normally added when in company transportation, and 50@55c. from New York, depending upon whether for upper or lower port shipment. Because of advances on these latter rates the increase alongside Boston is even greater than the foregoing table would show. Moreover, there is no longer the even basis that prevailed in other years.

Boston retail prices in short tons were as follows during 1916:

White Ash	Apr. 15	June 24	Aug. 19	Nov. 1	Nov. 3
Broken	$6.75	$7.00	$7.25	$7.50	$8.50
Egg	7.50	7.75	8.00	8.75	9.50
Stove	7.75	8.00	8.25	8.75	9.50
Nut	7.75	8.00	8.25	8.75	9.50
Pea	5.75	6.00	6.25	6.50	7.50

The high price in 1916, for stove, was $1.50 above the maximum for 1915. By Oct. 30 retail prices were on a basis of $12 in Providence, R. I., and $13 and $14 in Haverhill and Lawrence, Mass.

Other Features

"Independent" coal, mined largely by individual operators, figured in New England throughout the year. Current water freights were so high as compared with company barge rates that until the situation tightened up late in the summer dealers were not inclined to buy and the trade in "independents" was only scattering. During most of the period prices were close to the f.o.b. circular. In July light anthracite barges were sent east for ice, and the demand for outside coal began to broaden. By November retail prices were advanced and dealers had more courage to pay the high premiums asked; $9 was quoted alongside Boston in October for a proportion of egg and stove, while early in November $13.25 was paid for an assorted cargo, and $14 and $12 respectively was paid alongside Boston for chestnut and pea.

Mild weather late in November modified these quotations considerably, but speculative coal yielded some rich profits the rest of the year. An inquiry instituted by the Federal Department of Justice disclosed little except that hysterical buying was partly responsible for the panic prices. In a statement to the press the district attorney made the observation that the American people had not yet learned how to handle a sellers' market.

At the end of the year alongside prices on "independent" coal were again on a basis of $10 and $6.60@7 was the average price f.o.b. mines.

Ocean Freights

Reading barge rates on bituminous, Philadelphia to Boston points, were $1.25 until spring when they were advanced to $1.50, remaining unchanged the balance of the year. The demand has so far exceeded the supply, that what amounted to a six-months waiting list was in operation. Barge freights to Long Island Sound, New York loading, fluctuated with the demand, the anthracite situation accounting for the highest figures; $2@2.25 was paid early in the year, gradually receding to 80c. in the dull May market. Again in August the trend was upward until in September $1.25 was paid. Except for brief intervals of bidding-up, $1.25@1.35 continued the range to the end of the year. When loading became unreliable, boat owners insisted upon laydays, one 1200-ton barge in December collecting $2000 demurrage. Market rates to Boston varied from $1.35@2.25 on about the same lines as to Long Island Sound.

Traffic through the Cape Cod Canal was twice seriously interrupted by steamers getting afoul the rip-raps and sinking. One boat had to be dynamited to clear the passage.

Progress in the Export Trade

By J. S. Burrows*

SYNOPSIS—Exports to the purely foreign markets show a large loss, chiefly to Italy. South American markets make a gratifying increase. Increased shipments from Hampton Roads and a decline at Baltimore. Foreign consumers better impressed with American coals.

In reviewing the export trade of the past year, one feels inclined to ask: Is the world's consumption of coal gradually declining as a result of the war? Are coal-importing countries finding cheaper substitutes for fuel, or are the revolutionary changes in trade channels diverting business to the less important coal-producing countries?

Two years ago we believed that with Germany out of the way and Great Britain seriously handicapped, we were about to enter upon an era of unprecedented activity in coal exports. The fact is, that notwithstanding the increase in 1915 exports, the expected demand for American coal has, after two and one-half years of the war, failed to materialize, as will be seen from our off-shore shipments, which show a decrease in 1916 of more than 20 per cent. as compared with 1915. This loss in off-shore tonnage has not been made up by shipments from Great Britain, as her exports also decreased during the year. The explanation, therefore, lies in some other direction and cannot be arrived at until the export statistics of Australia, Japan and other of the less important coal-producing countries are available.

While off-shore exports have decreased, the total tonnage for the year classed by the Government as exports will probably mark 1916 as a record year. Based on the statistics now available, I estimate the total shipments at 22,690,000 tons, an increase of more than two and one-third million tons as compared with the previous year.

The increase in the total export tonnage is due entirely to the vast increase in our shipments across the international boundary into Canada. Canada's remarkable recovery from the general business depression that curtailed her coal consumption during 1914 and 1915 is obviously responsible for the heavier shipments of the past year. Exports to Canada increased nearly one-third during the year and in the absence of complete figures are estimated to have been as follows, in tons:

	1916 (Estimated)	1915
Anthracite	3,900,000	3,440,000
Bituminous	11,500,000	8,354,000
Total	15,400,000	11,794,000

It is when this Canadian tonnage is subtracted from our total exports that the deficiency in what we may term genuine export business becomes apparent. Excepting Canada and including a small rail tonnage to Mexico, our estimated off-shore exports were as follows, in tons:

	1916 (Estimated)	1915
Anthracite	90,000	102,000
Bituminous	7,200,000	8,408,000
Total	7,290,000	8,510,000

*Fuel expert, Castner, Curran & Bullitt, Norfolk, Va.

Under normal conditions a large part of the world's coal exports finds its way into ships' bunkers, and it is of interest in this connection to note that while our off-shore exports decreased, our delivery of bunker coal to foreign ships in American ports increased about 300,000 tons over the total of 7,464,000 tons supplied to steamers in 1915. This increase in bunker supplies took place mainly at New York, which is not an important coal-exporting port.

The Foreign Markets

Further particulars of our coal exports for 1916 are given in Table 1, which presents the latest available Government figures for the first nine months of the year. An analysis of this table partly shows which markets have been responsible for our loss abroad.

As we have been greatly interested in the development of South American trade, it is gratifying to note that we have done a little more than hold our own there. In 1915 we trebled our shipments to South American countries, while last year our gain was not more than 10 per cent. This market now takes about two million tons of bituminous coal, as compared with less than one-half million tons before the war. It would seem, however, that our exports to South American countries should have made much greater gains in 1916, in view of the fact that receipts of British coal in those countries were less than half the 1915 shipments.

A considerable portion of our tonnage was shipped to Argentine and Brazilian railways, which in some instances have already arranged for continued supplies over the current year.

In the Caribbean market, including Mexico, Panama and Cuba, we have supplied nearly the same tonnage as in 1915. Outside of Mexico and Cuba, this is largely a bunkering market, as the greater part of our shipments are delivered to coaling stations to which American coal has been supplied for many years.

Our Italian shipments, which became of leading importance in 1915, show a loss of more than 700,000 tons for the first nine months of the year. It is this loss, coupled with a decrease in shipments to "other countries," mostly European, that has been the cause of the decrease in our total overseas trade. This loss was not made up by exports from Great Britain. In the case of Italy, the amount of British coal shipped was practically the same in both years.

The Loading Ports

The bulk of our export coal was loaded at the ports of Hampton Roads, Baltimore, Philadelphia and New York. In addition to these main ports, some coal was shipped over the new pier at Charleston, S. C., and also from Mobile, Ala., and Pensacola, Fla. Table 2 shows the comparative monthly shipments of the four important ports for 1915 and 1916.

It is of more than ordinary interest to note from this table that a smaller percentage of the loss in foreign trade fell upon Hampton Roads, the largest shipper, than upon the other ports. At this port the aggregate loss for the year was less than 100,000 tons. As compared

with the other ports, Baltimore's exports suffered the most, declining to less than half of the 1915 total. Philadelphia's exports decreased nearly 15 per cent., while New York, which loads less coal for foreign shipment than the others, remained about the same. It would appear, therefore, that the loss of business in overseas markets fell mainly upon the Pennsylvania and northern West Virginia coals, which are shipped almost exclusively through Baltimore and Philadelphia.

The strong position which the Hampton Roads ports have maintained, again marks this locality as the premier shipping point for export coals. The newer loading piers at Lamberts Point, Sewall's Point and Newport News, with their facilities for giving quick dispatch to steamers, have more than justified their heavy cost in time saved during the past two years of exceptionally high water freights.

The fluctuations in monthly loadings were about the same as in 1915. The heaviest tonnage was handled in fact it is becoming more the custom each year for foreign buyers to allow Hampton Roads shippers to supply either Pocahontas or New River at their option, according to which coal is in greatest supply at the moment, or which loading piers are best situated for quick dispatch. At Balimore and Philadelphia nearly the same grades of coal were loaded, consisting of Georges Creek and Fairmont (particularly at Baltimore) with various grades of northern West Virginia, Maryland and Pennsylvania coals, embracing Clearfield, Cambria, Somerset and Broad Top steam coals, and Westmoreland and Pittsburgh gas coals.

Of especial interest in connection with this phase of the export business has been the increasing demand at Hampton Roads for classes of coal other than the standard Pocahontas and New River. One shipper in particular has developed a good demand for the best grades of hard West Virginia splint coals in markets which have heretofore been supplied with Scotch splints. Incidentally, it has been demonstrated that this grade of coal, in

TABLE I. UNITED STATES EXPORTS IN 1916 (Gross Tons)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	9 Mos. Total
Anthracite										
Canada	257,608	289,602	301,620	203,961	442,508	506,932	386,049	384,267	349,887	3,130,340
Argentina	.....	.....	.....	995	.....	.....	400	.....	135	1,530
Brazil	100	.....	.....	.....	1	.....	327	.....	.....	428
Uruguay	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other countries	17,278	3,939	8,335	8,637	8,276	8,207	3,302	9,977	3,485	68,214
Bituminous										
Italy	100,039	161,614	142,323	209,557	160,465	230,968	211,718	218,525	94,430	1,529,639
Canada	536,264	540,789	546,307	745,432	1,310,026	1,318,095	1,299,906	1,525,622	1,356,741	9,095,203
Panama	36,026	34,498	26,957	12,000	48,030	27,553	24,075	45,815	48,082	303,036
Mexico	23,099	24,270	21,191	19,765	18,156	7,716	7,165	16,080	20,641	154,283
Cuba	80,860	87,846	116,195	95,174	115,427	108,579	117,949	135,438	124,629	984,614
West Indies	46,109	51,988	46,124	38,129	44,229	36,163	29,170	30,082	18,506	340,500
Argentina	33,142	21,545	60,780	93,382	100,583	103,176	115,591	106,729	91,147	726,075
Brazil	31,401	45,142	81,394	49,287	107,087	61,308	57,566	100,993	87,477	621,655
Uruguay	8,159	4,049	2,250	7,713	10,278	36,829	20,366	13,829	25,841	129,314
Other countries	47,045	70,179	25,697	58,168	69,819	135,122	148,512	191,470	135,859	881,704
Coke	90,890	88,115	93,980	92,070	91,147	89,835	57,377	80,955	95,571	771,519
				Gross Tons, 1915						
Anthracite										
Canada	188,781	176,966	124,114	445,118	412,479	352,234	267,712	293,318	277,143	2,538,865
Argentina	.....	.....	212	.....	.....	.....	.....	1,740	134	2,469
Brazil	.....	.....	.....	18	.....	.....	.....	2,372	.....	2,415
Uruguay	.....	.....	.....	.....	.....	5	.....	600	.....	605
Other countries	1,518	1,274	1,869	8,391	10,215	397	2,939	9,107	13,073	48,395
Bituminous										
Italy	88,622	.....	72,371	253,273	285,027	383,019	502,750	382,154	324,925	2,348,870
Canada	354,210	302,594	273,395	381,223	589,512	873,239	1,016,413	947,069	944,800	5,682,455
Panama	28,069	26,578	47,600	42,946	34,321	47,708	52,805	49,423	59,969	389,419
Mexico	44,128	18,916	34,899	32,966	30,247	22,445	16,708	18,507	21,787	240,603
Cuba	59,197	75,646	110,585	101,013	107,650	74,984	91,162	114,299	109,269	843,805
West Indies	13,797	24,007	46,563	55,055	34,471	48,406	43,959	42,347	44,835	353,440
Argentina	7,259	32,974	33,404	79,531	108,730	157,831	114,162	128,823	56,305	719,019
Brazil	19,375	28,705	42,227	66,582	65,183	122,484	84,813	53,002	61,223	544,194
Uruguay	.....	.....	10,273	36,503	14,401	11,968	26,689	30,956	4,275	135,065
Other countries	18,488	75,468	20,937	63,576	134,735	191,326	279,604	234,268	205,589	1,167,262
Coke	57,447	44,309	59,701	56,113	74,581	68,628	69,845	83,085	59,395	573,104
Totals										
Anthracite '16	274,986	293,541	309,955	213,593	450,785	515,139	390,078	394,244	353,507	3,200,512
Anthracite '15	190,299	178,240	127,195	453,527	422,694	352,636	270,651	307,137	290,350	2,592,749
Bituminous '16	942,144	1,041,920	1,069,218	1,328,607	1,984,100	2,065,509	2,032,018	2,384,583	2,003,353	14,766,023
Bituminous '15	633,145	584,888	692,854	1,112,668	1,404,277	1,933,410	2,229,065	2,000,848	1,832,977	12,424,132
Grand total, '16	1,217,130	1,335,461	1,379,173	1,542,200	2,434,885	2,580,648	2,422,096	2,778,827	2,356,860	17,966,535
Grand total, '15	823,444	763,148	820,049	1,566,195	1,826,971	2,286,046	2,499,716	2,307,985	2,123,327	15,016,881
Foreign bunkers, '16	570,461	536,513	562,267	579,502	741,167	727,168	722,681	780,561	739,289	5,959,618
Foreign bunkers, '15	528,418	502,499	579,027	655,465	647,918	727,880	712,872	672,990	651,154	5,678,163

the summer months, with August leading. Nothing like the record monthly dumpings of last year were equaled, however, and in the case of Baltimore, the largest dumping was only 104,000 tons in August as compared with 305,000 tons in June of 1915. There was a general falling off in loadings during the last quarter of the years, which obviously was due to the scarcity of coal, while the smaller tonnage handled during the last quarter of 1915 was attributable to the scarcity of bottoms.

Coals Shipped Off-Shore

As in past years, more Pocahontas coal was loaded for foreign shipment than any other grade. Although this coal is better known abroad than any other American product, New River is a close second in popularity. In screened sizes, stands loading, transportation and discharging better than any other American coal. The Virginia gas coals have also increased in foreign demand during the year, moving through Lamberts Point and Charleston, S. C., to new users whose favorable reports presages a growing market abroad.

For many years it has been dinned into our ears that our steam coals are too fine or, as we say, too slacky, to compete with British coals in foreign markets and that we should screen Pocahontas, New River and similar grades for export. This prejudice has undoubtedly been the greatest obstacle to our coals in competitive markets abroad and is one that our exporters have endeavored to overcome by explanations of our own successful methods of using run-of-mine coal.

Our contention that our semi-bituminous coals are too soft and friable to be shipped overseas as screened grades was put to test during the past summer at Hampton Roads, when the experiment was tried of loading lump coal. On a few occasions in the past special cargoes of Pocahontas lump coal have been loaded over the piers in the regular way, but as the modern coal pier is not especially well adapted to loading a friable screened coal, there was always considerable more breakage than was necessary. As a result of the natural friability of the coal and the rough handling it received these special cargoes appeared little better than a lumpy grade of run-of-mine.

In this latest experiment the opposite extreme was adopted of sacrificing speed and everything else to getting the lumps into the ship with the least possible amount of breakage. Something less than 1,000 tons was loaded by hand into baskets which were lowered into the hold with the ship's tackle and carefully dumped. Some idea of the care taken in loading may be gleaned from the fact that nearly five days of two shifts were consumed in loading this lot of coal as compared with about two hours' ordinary pier time. It is evident that this was a test of coal and not of handling methods, with the object of determining minimum breakage in loading, regardless of cost or other considerations.

Despite the care used in the experiment, there was a great deal of slack made, much more than is ordinarily seen in the small stock piles at retail yards, which was the only means of comparison. But no matter what the means of loading, the result of the mass action of 1000 tons or so of irregular lumps, with many sharp brittle facets and the effect of digging them out at destination with more grinding and rolling, cannot help but make considerable slack.

The experiment demonstrates fairly conclusively that we cannot hope to load our friable semi-bituminous coals with what might be termed a reasonable amount of breakage. However, it opens the question as to whether we would strengthen our position in competitive foreign markets by shipping lump coal containing, say 30 to 40 per cent. slack, at the full lump price, or run-of-mine coal containing 40 to 50 per cent. coarse coal at a lower price, as at present.

Meanwhile, the long-standing objections to run-of-mine coal are being gradually overcome by practical test in many markets, and as new customers are educated to proper methods of burning this grade complaints gradually disappear. Given sufficient time, therefore, it would seem that with the continued export of run-of-mine coal, and also the increasing sale abroad of American boiler plants, locomotives and various forms of coal-burning apparatus, all based on the common American practice of using run-of-mine coal, the old prejudice will ultimately disappear.

Coke Exports

The larger shipments of coke abroad during the year demand some attention. Leaving out coke shipped all-rail into Canada, coke exports during the year amounted to approximately 300,000 tons. Under normal conditions our off-shore export business in coke is principally with the smelters of Mexico who, since the beginning of the Mexican trouble, have been almost at a standstill, in consequence of which this market has been virtually closed.

To take its place quite a number of scattered orders have been received from South American countries and elsewhere for small lots or part cargoes of furnace and foundry coke, with here and there a solid cargo. Most of this business has come about through the shutting off of the German supply of byproduct coke and the great reduction in the British output. It is probably not permanent business, although in view of the extensive development of byproduct oven plants in this country it could no doubt be used as an entering wedge in fostering this trade, if the proper effort were made.

Export Prices

As Pocahontas and New River quotations virtually constitute the base price for export business, it will suffice to review here the prices in force at Hampton Roads during the year.

By far the larger portion of the export trade, embracing the important Italian business, West Indian coaling stations, foreign agencies and Panama Canal business, is handled under yearly or longer term contracts. Most of these contracts were closed during the last months of 1915 or earlier, at prices which ruled at that time and which, with a few exceptions, ranged around $2.90 f.o.b. Hampton Roads. Spot prices remained at about the same level during the earlier months of 1916, gradually strengthening throughout the summer until the greater acceleration during the last half of the year was revealed in the announcement of the bids received for the Panama Canal supply.

There were only five bids, totaling 630,000 tons against 500,000 to 600,000 asked for, with the price from $3.40 to $3.50. From the earlier part of September, when the Panama bids were opened, down to the close of the year, spot prices rose almost perpendicularly, reaching $5 in the latter part of October and $7.50 by the middle of the following month, as coal became more scarce. From then on to the close of the year there was so little free coal available over that needed for contract requirements, that the still higher quotations reported were purely nominal, although a small volume of business was done at those record figures.

New Facilities and Improvements

The most important development during the year in coal-handling facilities of Tidewater has been the building of the new Curtis Bay pier of the Baltimore & Ohio R.R. at Baltimore. As the year closes, this pier is still under construction, but no doubt it will be finished in time to be an important factor in the Baltimore trade during 1917. The new pier is of unusual interest to those concerned in the handling of coal at Tidewater on account of its peculiar design, in which it differs radically from the accepted standards as respresented by the new piers at Lamberts Point and Newport News.

Instead of the usual steel structure with car deck and pockets, 80 to 90 ft. above water level, the Baltimore pier is at ground level. A combination of belt conveyors and movable bridges on the pier, working in conjunction with concrete storage pockets, and a car dumper at the shore end are employed in place of the large conveyor cars, hoppers and chutes used at the Hampton Roads piers. Just what will be gained from this new design can only be learned after the new pier is put in operation.

A new branch of the export trade was started at Norfolk in the late fall when a company was organized for the purpose of manufacturing briquettes exclusively for export shipment.

The briquettes will be cylindrical in shape, with rounded ends, and will weigh nearly a pound each. Pocahontas coal will be used, and it is proposed to especially equip one of the Lamberts Point piers for loading the fuel into ships. The plant is the largest that has so far been built in this country and embodies the best designs in coal-handling and briquette machinery, with large storage and screening plants for coal.

TABLE 2. EXPORTS AND BUNKERS BY PORTS (Gross Tons)

	Anthracite		Bituminous		Coke		Bunker Coal	
Hampton Roads	1915	1916	1915	1916	1915	1916	1915	1916
January	.....	.....	109,586	284,951	124	3,366	101,741	146,668
February	.....	126	150,417	373,579	979	6,852	120,842	118,543
March	.....	.....	262,687	375,307	452	3,203	120,357	125,828
April	.....	.....	448,329	416,712	994	1,992	172,012	128,748
May	.....	.....	445,917	497,166	5,361	7,254	146,291	187,111
June	85	10	608,599	535,987	6,642	4,625	159,155	178,621
July	.....	.....	765,778	536,979	701	1,507	177,499	185,904
August	212	217	662,122	588,435	2,125	1,488	188,228	197,237
September	.....	.....	603,558	423,623	.....	3,674	162,190	182,980
October	.....	.....	447,556	.....	4,169	.....	137,681	.....
November	75	.....	316,634	.....	5,272	.....	110,315	.....
December	244	.....	361,663	.....	6,084	.....	107,195	.....
Total, year	606	.....	5,183,846	.....	32,903	.....	1,703,506	.....
Total, 9 mo	297	353	4,057,993	4,032,739	17,378	30,287	1,384,315	1,451,640
Baltimore								
January	.....	.....	89,779	42,302	668	2,257	41,496	28,660
February	.....	.....	79,029	68,642	.....	3,525	39,974	27,031
March	.....	.....	76,888	56,072	.....	3,298	35,265	38,775
April	643	991	193,293	83,320	418	4,504	60,783	37,371
May	298	.....	232,866	69,820	396	13,692	56,986	56,285
June	.....	329	305,917	91,342	8,010	7,003	76,850	50,598
July	85	.....	258,585	100,084	12,072	2,483	53,113	49,478
August	2,128	.....	210,760	104,795	5,775	14,557	52,914	53,550
September	.....	.....	200,926	96,680	208	9,270	48,456	53,932
October	.....	.....	139,652	.....	7,319	.....	47,244	.....
November	.....	.....	43,836	.....	402	.....	31,592	.....
December	.....	.....	69,935	.....	23	.....	38,956	.....
Total, year	3,154	.....	1,901,466	.....	35,291	.....	583,629	.....
Total, 9 mo	3,154	1,320	1,648,043	719,057	27,547	60,589	465,837	295,680
Philadelphia								
January	1,127	15,347	40,648	54,134	769	2,567	30,098	31,395
February	386	1,429	32,794	33,807	95	96	22,026	29,231
March	2,371	7,175	43,290	64,522	330	3,520	32,948	34,984
April	6,169	2,571	60,207	54,736	.....	.....	34,600	40,676
May	9,614	297	107,645	76,167	3,591	372	41,532	35,570
June	5,387	5,822	121,379	86,928	61	1,051	46,574	43,418
July	5,458	3,722	167,321	70,133	26	2,910	47,053	37,303
August	9,499	9,435	154,965	134,161	1,742	5,134	42,862	42,258
September	11,552	1,661	64,351	98,349	97	1,276	29,648	46,632
October	18,908	.....	87,775	.....	3,538	.....	36,800	.....
November	2,763	.....	73,985	.....	.....	.....	33,051	.....
December	12,343	.....	87,478	.....	4,553	.....	30,519	.....
Total, year	85,550	.....	1,041,836	.....	14,832	.....	427,671	.....
Total, 9 mo	51,563	47,450	792,600	682,939	6,741	16,925	327,301	341,467
New York								
January	3,095	8,921	1,543	893	70	136	250,102	269,068
February	2,827	8,740	1,345	1,245	131	817	223,654	262,303
March	4,603	8,231	554	2,193	31	2,177	267,104	277,234
April	19,364	19,257	2,966	2,225	40	1,677	266,826	259,944
May	18,081	17,809	3,044	4,419	628	1,331	273,142	309,420
June	20,685	20,240	4,201	5,108	644	966	318,589	313,064
July	29,197	19,489	3,021	4,387	1,636	1,879	289,202	296,474
August	35,848	40,671	8,656	6,025	725	1,195	257,570	321,099
September	20,273	6,800	2,008	1,012	2,922	2,447	284,634	304,331
October	16,148	.....	1,075	.....	135	.....	274,423	.....
November	19,706	.....	2,392	.....	59	.....	279,256	.....
December	6,838	.....	2,309	.....	69	.....	289,432	.....
Total, year	196,665	.....	33,114	.....	7,090	.....	3,273,834	.....
Total, 9 mo	153,973	150,167	27,338	27,507	6,872	12,543	2,430,823	2,617,937

Prospects for 1917

At the beginning of the new year we are confronted with an extraordinary demand for coal at home that promises to hold as long as this period of prosperity lasts. Coupled with this is the most stringent car shortage in the history of the trade, both resulting in the highest prices on record. Labor is short only in the sense that there is no unemployed surplus.

At the mines we have sufficient loading capacity to take care of this great home demand and leave a surplus for export. At the loading ports we have sufficient pier capacity to take care of coastwise business, with room for foreign loading. Our car supply, however, is too inadequate to make full use of our productive capacity. In other words, we are over-equipped at either end and under-equipped in the middle.

The problem confronting us then is purely a question of transportation. With so many uncertainties concerning the home demand, the possibility of a better car supply or a still greater shortage, the stability of the present high prices, etc., it is not likely that much contract business will be closed for export or that for the first part of the year at least the export movement will be more than the absolute requirements of buyers.

If these were normal times, this would be a year in which we would lose ground in foreign markets, our competitors stepping in while we are engrossed with the huge demand at home.

The point is, however, that these are not normal times and that fundamental conditions in the coal-producing countries of the world are such as to cause a continued decrease in the surplus available for export. The belligerent countries need more and more of their declining outputs at home, while the United States stands at present as the greatest of the few remaining sources of supply.

Ocean Shipping Conditions

SYNOPSIS—A record year in freights and in vessel building. Prospect is inviting for owners of all kinds of tonnage. The current opinion is that the world-wide shortage of boats will not be made up for several years to come.

The year 1916 was a boom period for American shipping. A consistently high level of freights and every shipyard supplied with orders for years ahead were the notable features in coastwise freighting. On July 1, for instance, there were 385 vessels building or under contract in the United States. During the second year of the war 35 large merchant steamers were launched from American yards, 21 of them larger than 5000 tons. All records were broken, and the end is not yet.

Only a few years ago the great bulk of steam coal for New England was carried from Hampton Roads in large fore-and-aft schooners, 2000 tons up to 5800, but by 1914 steamers had been built so rapidly that coastwise shipping was in serious straits. Freight rates had ebbed so low that it was difficult to pay expenses, and charters were often unobtainable on any terms. The European War changed all that, and for some years at least we are not likely to see any year-round surplus of tonnage. The "fore-and-afters" are coining money on coal to South America, Spain, and other offshore points, and bringing back rich cargoes.

Every steam collier that can possibly be spared from the coastwise trade is off on the same business. One 7300-ton steamer was chartered offshore for $40,000 per month for five years. The profits on sales of schooners and ships continued to be sensational, quotations on steamers advancing almost from week to week. Meanwhile, boats of larger capacity are being built, ostensibly for the coastwise coal trade, and owners can well afford to part with old boats, 2000 to 3500 tons, in response to foreign government demand, if 9000 and 12,000 ton ships are to take their places.

Conditions are favorable for rates not less than $2 from Hampton Roads to Boston on a contract basis during 1917, and it is possible that $2.25 might be had. Where steamers can make weekly trips and carry large cargoes it will be easier to hold the freight market, and since the supply of such bottoms is likely to be pared down to actual necessities on account of the remunerative business offshore, war or no war, there is little prospect of any weakness. New England's fuel bill will be high in consequence, but it will continue to be a problem of getting supply forward rather than what it should cost.

From Hampton Roads

The year opened with the highest freights the market has known in a generation; $3.50 was paid to Boston on large boats. New England wanted coal, shippers were trying desperately to make up arrears on contracts, and all the bottoms offering were quickly snapped up at going rates. For a time, steamers just launched were the only available quick transportation. For a single trip $3 was paid one collier, three days to load and discharge, demurrage $2000 per day.

With milder weather and immediate wants cared for the trend was so much easier that $1.50 was accepted to Boston for a short time, but one or two storms later promptly sent rates back to $2.50. Coal factors who had been relying upon soft rates got their object lesson in the extremely sensitive condition of the market. The whole twelve months took but little in the way of excess demand to push freights up to high levels. So closely were conditions followed that several colliers were being chartered trip by trip during the spring, the owners not caring to tie up either coastwise or offshore until further developments.

In April it was realized that New England must bid against export business to get forward an adequate fuel supply. Transportation was consistently scarce. For each order the market had to be scoured for boats, and about the only relief came from the factors themselves, who concluded to recharter to other interests rather than risk expensive delays on their own coal at the piers. A few colliers were brought from the Lakes, but usually it took so long to re-fit that they had no special effect on the market. Transportation owners were in position to pick orders, in any case.

Midsummer saw a pause in the previous steadily advancing rates offshore, due partly to drastic measures by the British admiralty, and steamer interests could better gage prospects. Those with boats on the stocks, however, were much more interested in finding customers for the hulls than in making coastwise rates. In July a Norfolk agent said he had not heard of a single sailing vessel offering for Eastern charter since the beginning of the year.

Shortly afterward, however, a few large schooners, one of them on the British "blacklist" and the others just returned from foreign charters, were offered, but it was the shortage of coal just then that was the controlling factor. The sale of the "Penobscot," "M. E. Harper" and "F. J. Lisman" to French interests was certainly not an indication of lower freights. Shortly the market was sentimentally firmer, but loading was so uncertain that both parties were cautious about commitments. Rates were nominally $1.86@2 to Boston. Most shippers, in September, were under engagement to load more bottoms than the current mining would justify, and for a period the demand could not have been said to exceed the supply.

Very few, however, were then returning from offshore, and they were available coastwise usually for only a single trip. One steamer, after canvassing for an order coastwise, chartered on general cargo to Cuba. In other words, had there not been a ready demand for export, coastwise freights would have slumped. It was realized in October that unless more coal would be available at the piers there would be no strength in rates from Hampton Roads. If a boat sought to charter, the range would be $1.65@1.75, but in the few cases where position was reversed the rate was $2.

For the rest of the year new charters from Hampton Roads were very rare. No shipper cared to take bottoms if he could possibly avoid it, unless it was for a speculative cargo on which he was certain of a high price. Owners of barges preferred the short run from New York to Long Island Sound, and offerings were much fewer for a long period than in any recent year

The Philadelphia Bituminous Market in 1916

SYNOPSIS—The opening period saw some sharp advances though conditions were uncertain and mixed with subsequent reactions culminating at the low point of the year in midsummer. A gradual advance occurred from this time on, touching record prices in November, and the year wound up with the market strong though with prices somewhat under the maximum.

The eventful history begun by bituminous coal in 1915 continued into and through 1916. Late in November, 1915, with the prices slowly rising, it was predicted that $2 coal would be reached before the first of the coming year and to the surprise of all some grades at that time actually sold at $3, although the price ranged down to $1.60. The industrial boom sweeping over the country was of such magnitude that coal shippers were hard pressed to meet the demand.

Toward the middle of January prices sagged somewhat, due to the fact that embargoes placed to the north and east of this city threw a considerable tonnage upon the local market with the result that prices moved off slightly. However, with the removal of these embargoes later in the month prices began to strengthen and by the close of the month a new high level of $3.25 was reached for the best grades, while the lowest price recorded was $1.95. A number of suits were entered against shippers at this time, owing to their inability to meet their contract obligations, due principally to poor railroad movement.

Uncertainty During the Opening Period

With the coming of February an embargo placed by the Pennsylvania R.R., preventing shipments east of Trenton, N. J., caused a sagging of 35 to 45c. a ton on all grades. However, the demand continued active, with a considerable quantity of fuel going into storage, although the larger proportion was for immediate consumption, as the industrial plants were being operated at a high pitch. The fact that the miners announced about this time that they would continue at work after Apr. 1 pending the signing of a new working agreement had no particular influence on this market, as its effect had been discounted in advance.

During the second week prices eased off from 5 to 35c. The announcement was made at this time that by a change of sizes the anthracite operators would eliminate pea coal caused the bituminous shippers to speculate on the possibility of introducing bituminous coal in this market as a domestic fuel. The decline persisted through the third week of the month, though the mining interests were loath to believe that the recession would continue for any extended period and as a consequence would give no long commitments as to price. However, the downward tendency continued right to the close of the month, when the price range was from $1.40@1.50 to $2.75@3 as compared with from $1.70@1.80 to $3.10@3.25 at the opening of the month.

The question of contracts was given some consideration during the month and a few were closed at $1.75 without any protection against an increase in the miners' wages, while others with this clause inserted were closed at $1.60. While shippers showed considerable willingness to contract, there was still a feeling that a better price would prevail later.

March opened with the prices continuing downward, Georges Creek Big Vein bringing $2.50@2.75, with the cheaper grades such as Fairmont mine-run quoted at $1.30@1.40. Contracts were quoted at $1.50@1.75, although consumers showed no tendency to close, claiming that while they were willing to pay a higher figure than last year, they did not think the present advance justified by conditions. While the demand was fairly good throughout the month, prices continued to drop and at the end of the month the ruling figures for the highest grades were $2.25@2.50, while the cheapest coals ran $1.25@1.35. Owing to the unsettled conditions in the anthracite trade bituminous shippers showed considerable hesitancy in closing contracts for steam coals, even though a wage scale had been agreed upon in most of the soft coal districts.

The decline continued into April, with changes of from 5 to 40c. per ton, and Georges Creek hardly able to command even $2 a ton, whereas six weeks before it was active at $3. The lowest quotations made at this time were for Fairmont slack, which was offered at $1.10@1.20. Despite the fact that difficulty was being experienced in coming to a settlement on the wage question in Central Pennsylvania, prices continued to shade off. This was due mainly to the numerous embargoes, which prevented coal from passing to the north and east of the city, throwing a large extra tonnage on this market. The orders on the shippers' books fell off quite considerably and as a consequence a number of collieries were reported closed or working on short time. The prices for the month closed at $1.90@2 for Georges Creek big vein and 95c.@$1 for some of the Fairmont grades.

The Dull Midsummer Period

The trade opened in May with stagnant conditions prevailing. While considerable contract business is ordinarily closed at this time, both parties were experiencing difficulty in getting together. The producers took the position that on account of the poor labor supply, with most mines running from 30 to 40 per cent. short, even higher figures were justified. With the settlement of the anthracite troubles there were some further price declines in bituminous, but on the whole the figures that prevailed in the latter part of April continued all through May with little change. A great deal of activity developed at this time in ocean charters for South American points, most of the business being taken at favorable figures, although the scarcity of vessel tonnage considerably hindered shipments. The business to European countries was practically at a standstill.

The opening of June found the market in a waiting position, with little business moving out of the ordinary, though the tonnages showed an improvement over the same period one year ago. Even under these quiet conditions deliveries were hampered by railway congestions and shortage of labor. In the early part of the month the Fairmont grades advanced about 15c. a ton, but this was due largely to local conditions, the miners in western Pennsylvania having gone out on a strike.

There was also considerable general contracting done at this time, as the consumers who had been indifferent earlier in the season began to show more interest in covering. It cannot be said, though, that the shippers were very anxious to close large tonnages. But with the exception of the Fairmont grades, as already noted, prices ranged quite close to those in the preceding month.

Market Steadies Up

The miners in the western Pennsylvania district having reached an agreement with the operators early in July, the pressure was relieved on shipments from the Fairmont region. Prices ruling at this time were the same as prevailed for the previous six weeks. Throughout the month the Fairmont coals by slight recessions settled back to their former position, while all other grades remained quite firm, as had now been the case for almost two months. This stability of prices following the decline from the $3 peak reached early in the year seemed to presage a forward movement, and in fact there were slight advances, before the close of the month.

August opened with prices stronger and before the middle of the month the demand had increased to such an extent that most houses were unable to fill their orders as promptly as desired. Contracting ceased almost entirely as very few shippers were willing to tie up their production in the face of the rising market. The car supply was also becoming a more serious menace, with most operators reporting a 50 per cent. allotment at the most. Industrial plants which had for some time been endeavoring to lay by stocks of coal began to have difficulty in getting more than was required for their current needs. Considerable activity also began to show in tide business, a large number of charters being made during the month. The upward price tendency is well illustrated by quoting the figures for two typical grades at the opening and closing of the month as follows:

	Opening	Closing
South Fork Miller Vein	$1.70@1.80	$1.95@2.00
West Virginia Freeport	1.25@1.30	1.35@1.40

September found the trade in a state of excitement due to the threatened general railway strike. Prices of all grades advanced rapidly, until the $3 figure was almost reached. But with the passing of the 8-hr. bill by Congress prices declined again though not to the previous low point. The railroads began pressing their contractors strongly for fuel at this time and beginning with the middle of the month the upward trend of prices became quite strong, while complaints were heard on all sides that contract customers were being neglected in order to take advantage of the open market. As the month wore on the demand for coal became so heavy that the big industrial plants began to send their own buyers into the mining regions. All grades had now passed the $2 point with no one willing to venture a prediction as to the future. The strongest demand seemed to come from New England and as a consequence the tide business for that territory was extremely brisk, although foreign shipments had almost ceased.

Market Begins To Speed Up

Throughout the month of October prices continued to climb rapidly; early in the month sales at $3 became quite frequent. Brokers were finding it very difficult to do a profitable business on account of the sudden changing of quotations. With only a small tonnage under contract the market became a most favorable one for the operators, who began to realize good profits on sales direct to the consumer. Quotations were never made for more than a day at a time, and by the middle of the month even the Fairmont coals were being sold at $3, although some of the grades were still under that figure.

Toward the close of the month it became simply a question of getting coal of any kind with $3 quoted for the cheapest grades as compared with $3.65 for the best, the bulk of the tonnage selling around $3.50. The mines were operating far below their capacities on account of the continued shortage of labor, while the car supply and railway movement throughout the month continued serious. Prices this month had risen so rapidly that predictions of $5 coal were freely made.

Early in November the market began to run wild and the predicted $5 price was quickly reached. Consumers were almost in a panic to get fuel, as they began to see visions of a recurrence of the $10 price which prevailed during the anthracite strike of 1902. Due to the big earnings the miners in many of the districts became restive and despite the new wage agreement which had only been in effect a few months began to make demands for increased wages and a number of strikes resulted. During the first days of the month all grades quickly reached the $6 price, with a maximum of $7.50. Conditions were such that quotations were only being made from hour to hour and salesmen were withdrawn from the street.

Inasmuch as the height of one of the most interesting price movements of the trade was reached in November it is interesting to compare these top figures with those ruling Apr. 1, which was really the beginning of the spirited advance. It might be well to recall that the figures shown for Apr. 1 are those quoted after the market had declined from a series of increases that had carried prices up to $3.25.

	April 1	Nov. 4
Georges Creek Big Vein	$1.90@2.00	$7.00@7.25
South Fork Miller Vein	1.70@1.80	7.00@7.25
Clearfield, (ordinary)	1.50@1.60	6.75@7.00
Somerset (ordinary)	1.35@1.45	6.50@6.75
West Virginia. Freeport	1.30@1.35	6.25@6.50
Fairmont gas, three-quarter	1.50@1.60	6.50@6.75
Fairmont gas, mine-run	1.35@1.45	6.45@6.55
Fairmont gas, slack	1.05@1.10	5.75@6.00
Fairmont lump, ordinary	1.30@1.35	6.40@6.50
Fairmont mine-run	1.15@1.25	6.30@6.40
Fairmont slack	1.05@1.10	5.75@6.00

With the coming of December the activity in the market continued, although in the early part of the month there was considerable unsteadiness in prices, but with all sales being closed between $5 and $6.50. During the second week of the month prices seemed to settle to a routine, with shipments difficult to make on account of poor car supply. At this time the miners became uneasy over their wages. In several districts demands were made for increases amounting to as much as 33⅓ per cent. Many of those operators not bound by contracts granted increases, which caused considerable loss to those operators who had most of their production sold under contract; on account of their miners being attracted by higher wages they were unable to meet their contract requirements. Toward the close of the month all conditions entering into the mining and transportation of coal seemed to indicate that increases in prices above those prevailing at the time would be reached by the first week of the new year. The average price for the month could be safely placed at from $5 to $5.75.

Connellsville and Byproduct Coke Industries in 1916

By B. E. V. Luty*

SYNOPSIS—The expected decline in the Connellsville coke industry failed to materialize and the year was one of the most profitable in its history. Prices fluctuated erratically, touching record levels on several occasions. Extraordinary activity in iron and steel production created an exceptionally heavy demand for coke.

The Connellsville coke industry is really a part of the iron and steel industry. It ought to follow, more or less, the ups and downs in the iron industry.

A revival in the iron and steel industry began at the close of December, 1914, and the improvement has been continuous and rapid for the past two years. Our review of 1915 noted that the vital fact in the Connellsville coke trade was that the market failed to respond sharply to the great revival in the iron and steel trade. In 1916 the conspicuous fact was that it failed to respond, by a downward movement, to the rapid growth of the byproduct coke industry.

Rarely in any industry has there been so radical a departure from the expected as occurred in the Connellsville coke market in 1916. The expectations of buyers and sellers alike, as to 1916, were clearly expressed by the coke contracts they made, chiefly in the period from the middle of September to the middle of October, 1915. The contracts that were made for the first half of 1916 when for the half year were generally at $2.35 to $2.50 and at about $2.25 when for the whole year.

The divergence in price was due to the accepted belief that by July or August there would be so many new byproduct ovens that many beehive ovens would be idle. The supply of coke absolutely reversed the expectation, as shown by the spot market, which dropped from $3 and higher in January and February to a low point of $2.25 in May and then advanced, slowly at first, but rapidly in the last three months of the year, until for a few days in November $8 was reached, still higher prices prevailing during a portion of December. Virtually these were record high prices for Connellsville coke and they obtained at the precise time when Connellsville coke had been predicted to sell at the cost of production.

Demand and Supply

It was not an increase in the demand for coke that made it so scarce. The blast furnaces of the United States operated at the fullest rate possible throughout the year and produced substantially as much pig iron, and therefore consumed as much coke in the one-half year as in the other. It was the supply that was scant, through a combination of causes.

First the chief influence was a shortage, not so much in men as in performance, as the men would not work steadily and frequently ovens were drawn a day late. Then there was a combination of car scarcity and heavy demand for coal. The first real strength in the coke market occurred at a time when the Connellsville coke operators were expecting to secure high prices for their coal, but they had not secured car allotments from the railroads, for shipping coal, and except when cars are very plentiful these allotments are difficult to secure. There was, however, a large increase in the amount of Connellsville coal shipped for byproduct coking, and the year 1916 may be set down as one in which the real movement of coal in this direction began.

Byproduct Ovens

Construction work on all the byproduct coke plants in course of erection at the beginning of the year proceeded much more slowly than had been expected, and several plants that were to be completed in the second half of the year were not brought in. The largest installation completed was that of the Youngstown Sheet and Tube Co., 204 retorts, put in operation in August and September. That, by the way, had been one of the chief "talking points" as to a reduction in the demand for Connellsville coke and a consequent decline in the market. The starting of these ovens was to "release" about 70,000 tons of Connellsville coke per month, but the outcome was otherwise, the coke not appearing in the market because the coke contracts with the steel company were arranged to change to coal.

Course of the Market

The course of the market was certainly trying on the nerves of both sellers and buyers. Contracts had been made, as already noted, at say $2.35 to $2.50 for the first half of 1916 and at about $2.25 for the whole year. When first-half contracts ran out fresh purchases were made at, generally, $2.50 to $2.75, higher prices instead of lower. In August the merchant furnaces began a pig-iron selling movement for the first half of 1917, at the existing pig-iron market, or even at slight cuts. Some covered for their coke at $2.75 to $3. Others delayed and suffered a severe loss in possible profits, while the operators who had sold found that they might have obtained almost twice as much for their coke by waiting. Some consumers did not buy coke because they expected to have byproduct, and when the expectation was disappointed they were forced to pay a high price for Connellsville coke.

So rapidly did the market move that nothing like an accurate approximation of the average prices realized is possible. The spot market showed fluctuations that certainly were wild. In May and June, 1915, when the iron market was fairly active, Connellsville furnace coke for spot shipment sold at $1.50 per net ton at ovens, a lower price than had ruled in the worst part of 1914, when the blast-furnace industry was languishing. Taking $1.50 as a base price, the market was at two and one-third prices in February and March, 1916, at one and one-half prices for a time in May, at two prices in September and at five prices, on an average, in November and December. The Connellsville beehive-coke industry was expected to begin to die in 1916, but what it did was to write the most glorious chapter, as to prices, in its long history.

*Oliver Building, Pittsburgh, Penn.

Production of Coke in 1916

The Connellsville coke region in 1916 marketed 21,654,502 tons of coke, having an aggregate value of $55,768,615, an average of $2.58 per net ton at the ovens. The coke trade during the past year was 20 per cent. greater in volume, and the value of the product increased 70 per cent. over 1915. The 1916 tonnage exceeded the banner year 1913 by more than a million tons, but the value of the product was less than in 1913, when the total output averaged $2.95 per ton.

The following tabulated statement, which was compiled by the *Connellsville Courier*, summarizes the coke trade for the past 36 years:

PRODUCTION AND VALUE OF CONNELLSVILLE COKE

Year	Total Ovens	Tons Shipped	Average Price	Gross Revenue
1880	7,211	2,205,946	$1.79	$3,948,643
1881	8,208	2,639,002	1.63	4,301,573
1882	9,283	3,043,394	1.47	4,473,889
1883	10,176	3,552,402	1.14	4,049,738
1884	10,543	3,192,105	1.13	3,607,078
1885	10,471	3,096,012	1.22	3,777,134
1886	10,952	4,180,521	1.36	5,701,086
1887	11,923	4,146,989	1.79	7,437,669
1888	13,975	4,955,553	1.19	5,884,081
1889	14,458	5,930,428	1.34	7,974,663
1890	16,020	6,464,156	1.94	12,537,370
1891	17,204	4,760,665	1.87	8,903,454
1892	17,256	6,329,452	1.83	11,598,407
1893	17,513	4,805,623	1.49	7,141,031
1894	17,834	5,454,451	1.00	5,454,451
1895	17,947	8,244,438	1.23	10,140,658
1896	18,351	5,411,602	1.90	10,282,043
1897	18,628	6,915,052	1.65	11,409,835
1898	18,643	8,460,112	1.55	13,113,179
1899	19,689	10,129,764	2.00	20,259,528
1900	20,954	10,166,234	2.70	27,448,832
1901	21,575	12,609,949	1.95	24,589,400
1902	26,329	14,138,740	2.37	33,508,714
1903	28,092	13,345,230	3.00	40,035,906
1904	29,119	12,427,468	1.75	21,748,069
1905	30,842	17,896,526	2.26	40,446,149
1906	34,059	19,999,326	2.75	54,998,146
1907	35,697	19,029,058	2.90	55,184,268
1908	37,842	10,700,022	1.80	19,260,040
1909	39,158	17,785,832	2.00	35,571,664
1910	39,137	18,689,722	2.10	39,248,416
1911	38,904	16,334,174	1.72	28,094,780
1912	38,884	20,000,873	1.92	38,401,676
1913	39,067	20,097,901	2.95	59,288,808
1914	37,965	14,075,638	2.00	28,151,276
1915	38,986	17,921,216	1.80	32,258,188
1916	38,362	21,654,502	2.58	55,768,615

Byproducts from Coke-Oven Operations*

The value of byproducts recovered from American coke manufacture in 1915 was nearly $30,000,000, a large increase over the previous high-water mark of $17,500,000 in 1914. Although there were material increases in the output and value of gas, tar and ammonia, which was to be expected with a greater output of byproduct coke, the increase in benzol products presented the most interesting feature of the year in the coke industry. The value of these products rose from less than $1,000,000 in 1914 to more than $7,760,000 in 1915, according to the United States Geological Survey. Benzol has been recovered in this country from coke-oven gas for a number of years, but prior to 1915 the market was small and prices were low.

In 1914 there were 14 benzol plants in the United States, but they were all controlled by one company, and therefore it is not feasible to publish the statistics of their production for that or previous years. In 1915 16 additional coke plants were equipped with benzol apparatus, and the output was very greatly increased.

The benzol products obtained in 1915 amounted to 16,600,657 gal. More than 13,000,000 gal. of the total output was reported as crude light oil and had an average value of 33c. Some of the plants have their own stills and refineries, and the pure benzol reported from those sources amounted to 2,516,483 gal. with an average value of nearly 57c., at least three times the value of crude benzol before the war, and 623,506 gal. of toluol, with an average value of $2.45 a gallon. Crude benzol, which in 1914 was used to some extent for motor fuel, contained the toluol, which is now separated out and sold at fancy prices.

Quantities and values of byproducts from coke-oven operations in 1915 were:

Product	Quantity	Value
Tar obtained and sold, gal.	138,414,601	$3,568,384
Ammonia obtained and sold:		
Sulphate, lb.	199,900,487	5,648,958
Liquor, gal.	10,626,612	1,240,473
Anhydrous, lb.	30,002,196	2,978,044
Gas produced, M cu.ft.	213,667,614	.....
Surplus gas sold or used:		
Illuminating, M cu.ft.	17,196,426	3,083,311
Domestic fuel, M cu.ft.	27,590,624	3,158,129
Industrial fuel, M cu.ft.	39,568,864	2,383,459
Benzol products:		
Crude light oils, gal.	13,082,678	4,301,281
Secondary light oils, gal.	182,039	28,731
Benzol, gal.	2,516,483	1,428,323
Toluol, gal.	623,506	1,529,803
Solvent naphtha, gal.	196,151	46,233
Naphthaline, lb.	465,865	46,959
Other products*	.....	379,491
Total byproducts	.....	$29,824,579
Coke, short tons	14,072,895	48,558,325
Total value	.....	$78,382,904

* Includes breeze, retort carbon, domestic coke and coke dust, and aniline oil.

Birmingham Coke Trade in 1916

Owing to the great activity in the pig-iron market in 1916, resulting in the placing in commission of practically every furnace stack in Alabama for which raw material could be secured, and the general revival in industrial conditions throughout the country, the coke trade in this state enjoyed the most prosperous year of its history. The demand for furnace and foundry coke was good through the first half of the year, and during the last six months the market was very strong. The trade and furnace requirements absorbed the entire production and there was no opportunity for stocking, except on the part of furnace-operating companies in a few instances where stacks were undergoing repairs. At scarcely no time during the year was the tonnage of free coke available adequate to meet the demands of the contract and spot business offered. During the last quarter trade conditions were specially favorable. The scarcity of both furnace and foundry grades became so acute in the face of an unprecedented local and foreign demand that prices soared to record levels of $5 to $6 per net ton at ovens for furnace and $11 per net ton at ovens for foundry coke. The only disturbing factors affecting the producers were the scarcity of cars for the movement of the product and the restricted facilities for increasing the output commensurate with the needs. A large tonnage of coke was marketed in California and Texas territory and a small quantity went to Mexican interests.

The production for 1916 was approximately 4,500,000 net tons, the record output for Alabama, being about 975,000 net tons in excess of the previous record for 1913 and 1,500,000 tons more than was produced in 1915.

The prospects for the coke trade in 1917 are highly favorable. Several hundred beehive ovens are to be placed in commission in addition to 60 byproduct ovens being constructed by the Woodward Iron Co. and 36 by the Gulf States Steel Co. The production in 1917 will probably be in excess of 5,000,000 net tons.

*From "Chemical Engineer and Manufacturer."

The Pittsburgh District in 1916

By B. E. V. Luty*

SYNOPSIS—The year brought some record-breaking prices, owing to an unprecedented demand, particularly from the steel industry. Contract obligations of the operators were so heavy that the latter did not benefit largely from the high spot prices, though these will have a potent influence on future contracts.

The coal industry was slow in yielding to the favorable industrial and financial conditions that obtained in 1916. In the preceding year it had done little more than show prospects of improvement. Viewed from the standpoint of market prices, there was a spectacular and altogether unprecedented improvement in the Pittsburgh district coal market, but the improvement was confined almost wholly to the last three months of the year; and as the volume of coal available for sale was limited, the advance in price was not reflected in earnings to any extent. Indeed, from that standpoint, the chief thing that occurred in 1916 was the establishment of market values by which profits could be made in 1917.

Wage Negotiations and Strikes

The chief factor in making market prices for prompt coal during the first half of the year was the labor situation. The year opened with prompt coal at about $1.50 for mine-run per net ton at mine, Pittsburgh district, with occasional offerings at somewhat lower prices. At this range there was a disposition on the part of consumers, during January and February, to stock up against a possible suspension of mining Apr. 1, when the biennial wage scale expired. Apparently, it was the expectation of most consumers that there would be a suspension.

Early in March an agreement was reached, but it was a settlement that did not settle. Perhaps no circumstances could be conceived that would have had a more unfavorable effect upon the market than those created by what was known as the "McAlpin Settlement." In the first place the "settlement" broke the prompt market, as consumers ceased stocking and began to draw upon their reserves. In the second place the terms were so poorly understood that many buyers hesitated about closing coal contracts with the usual proviso for a sliding scale price acording to the mining rate, as it was not clear what price they would have to pay. The regular circular price for the twelvemonth beginning Apr. 1 was $1.50, but that price was generally shaded, frequently by 15c. or more.

The average market price of spot coal during the first two months of the year was about $1.45, but owing to the conditions indicated the market dropped, the average in April being between $1.15 and $1.20. The year had opened with a number of embargoes and these were gradually limited, until early in April the last two important ones, of the Pennsylvania and the New Haven, were taken off. This action did not help the market, which drifted through April and into May, to advance only by reason of strikes growing out of disputes as to how the McAlpin agreement should be interpreted. A strong coal market was produced, with spot coal bringing from $1.60 to $1.75, but of course few operators were benefited. By July 1 the strikes were settled, and the coal market also settled—to $1.30—scarcely even a fair price and certainly not a profitable one, in view of the greatly increased cost of production.

*Oliver Building, Pittsburgh, Penn.

Lake Trade Unsatisfactory

The Lake trade was extremely unsatisfactory for Pittsburgh district operators. The contracts were placed at relatively low figures, and the labor troubles of late May and early June caused some buyers to cancel their contracts on account of the failure to ship, and to buy in other districts. Throughout the season it was difficult to secure Lake vessels, as there was an unprecedented pressure to move iron ore, and boats were disposed to make the up trip light in order to save a little time.

The Lake movement was wholly insufficient to meet the demand in the Northwest, and when the season closed there was much coal in cars at Lower Lake ports, which were at once reconsigned for all-rail movement to the Northwest. The all-rail movement is expected to continue throughout the winter, but from Illinois and Indiana fields as to the later shipments.

The Ascent of Prices

As already indicated, spot coal sold at times during the first half of the year, and also in July, at less than the average level at which twelvemonth contracts were made, although these contracts were at considerably below the circular price. So suddenly did the eventual stiffening of prices occur, that the advance above the circular price fell just at the time when the threat of a general railroad strike on Sept. 4 was removed. At the beginning of October spot coal was bringing $2, and at the end of the month the market was $4 to $4.25 for steam and $4.75 to $5 for gas.

There had been continued heavy demand for coal for export, but the demand did not penetrate to the Pittsburgh district to any extent until August. Then it increased sharply, and to this influence was soon added a car shortage that steadily grew more severe. The car shortage decreased shipments to large consumers, on contract, and the steel mills in particular became eager bidders for spot coal, the price being an altogether secondary consideration, as they were striving for the maximum production of steel that was bringing them profits of $30 to $40 a ton. The top was reached early in November, when there were some sales at $5.50 for steam and $6.25 for gas coal. The steel works require a considerable tonnage of gas coal for their gas producers.

In this particular period of high prices the common theory was that the close of Lake navigation would bring relief, by releasing many cars. There was more of a decline through a discounting of this expected development than there was when the time actually arrived for the released cars to return to the regular channels, for there was no actual increase in the car supply. The railroads were more congested, through the weather becoming unfavorable and through their being decidedly short of motive power.

The St. Louis Market in 1916

By E. J. Wallace*

SYNOPSIS—The year was one of large production and record-breaking prices. Many old mines reopened and others started. Large tonnages shipped to outside markets. Middle Western consumption being cut down.

In coal-trade annals for the St. Louis market the year 1916 will appear as the most prosperous in a general way. There were no record-breaking tonnages, it is true, but record high prices were attained.

The year, which started with business at a low ebb in price and demand, will long be remembered as the most extraordinary that the trade has encountered. In the opening months, as a heritage from the preceding year, an over-production of coal from all fields kept the local market well supplied.

Expiring Wage Scales Cause Uncertainties

In strike years—that is, in years when the agreement between the operators and the miners expires—there is usually an extraordinary demand from the first of the year on for storage coal, in the anticipation of a failure to arrive at a new agreement on Apr. 1. On several occasions in the past buyers have been loading up and with just one or two exceptions there was no reason for it. Consequently, the large steam plants paid an unusually high premium in this way for protection against fuel famine.

The past year there was no storage coal bought to speak of, and the few plants that did anticipate did not put in over two or three weeks' supply. This attitude on the part of buyers was a disappointment to operators and shippers and tended to keep down the price of retail coal to almost summer figures. Along in March it was definitely decided that there would be no suspension and this caused a depressed market—perhaps the poorest market that the end of March has ever seen. This condition prevailed for a month or two. The market on Jan. 1 was:

	Williamson and Franklin	Staunton and Mt. Olive	Standard
6-in. lump	$1.50	$1.25	$1.10@1.15
2-in. lump	1.35	1.15	.90@1.00
6x3-in. egg	1.40	.....	1.00@1.10
No. 1 nut	1.20	.....	.90@1.00
No. 2 nut	1.10	.....	.85@0.90
Mine-run	1.10	1.00	.85@0.90
Screenings	.80	.75	.70@0.75
No. 1 washed egg	1.50	1.40	1.40
No. 2 washed nut	1.35	1.25	1.25
No. 3 washed nut	1.25	1.15	1.15
No. 4 washed pea	1.25	1.10	1.00
No. 5 washed slack	.80	.70	.70

The general business revival that struck this section in the closing months of 1915 fast grew into a big problem early in 1916 and the steam demand became better than normal. This kept the market in healthy shape and prepared it for the shock that was to come when the demand outgrew the supply and railroad equipment failed.

The operating organizations of the Illinois field fixed upon a price that prevented its members from marketing coal at a loss, and from April on high-grade coal averaged 25c. a ton more for domestic sizes and from 10 to 15c. more for steam coal.

*Sales agent, Chicago & Carterville Coal Co., Wright Building, St. Louis, Mo.

As a result the smallest tonnage ever recorded moved for domestic until about August. On April 1 quotations were:

	Williamson and Franklin	Mt. Olive District	Standard
6-in. lump	$1.35@1.50	$1.25@1.35	$1.00@1.10
2-in. lump	.....	1.15@1.25	.80@0.95
6x3-in. egg	1.35@1.50	1.20@1.30	1.00@1.10
No. 1 nut	1.35@1.50	.....	.75@0.90
No. 2 nut	1.20@1.25	.....	.70@0.85
Mine-run	1.05@1.15	.85@0.90	.80@0.90
Screenings	.80@0.90	.70@0.80	.....
No. 1 washed	1.50@1.65	1.40@1.50	1.40@1.50
No. 2 washed	1.35@1.50	1.25@1.35	1.25@1.35
No. 3 washed	1.25@1.35	1.20@1.30	1.20@1.30
No. 4 washed	1.20@1.30	1.15@1.20	1.15@1.20
No. 5 slack	.70@0.80	.70@0.80	.65@0.75

In the spring months of 1916 the Standard market was flooded with cheap coal from mines operated on the cooperative plan. The coal was sold for what it would bring and the returns divided on the tonnage produced by each miner interested in the mines. This upset conditions until along in July, when the nuisance gradually disappeared.

Demand Increases and Supplies Shorten

As the demand grew there was an advancing sliding scale of prices on Williamson and Franklin County (Carterville) from April until early in August, when the anticipated strike of the railroad brotherhoods sent the market up. When the danger of this walkout was over, and with steam plants and retail yards loaded, a decline was looked for. However, fate was kind to the shippers, for a mild car shortage in the Illinois field kept down the tonnage of free coal. The result was that instead of a decline the market steadied itself and started upward, the wholesale price going from $2 on Sept. 1 to about $4 in November for shipments of Williamson and Franklin domestic sizes to St. Louis proper and to $4.75 for the territory adjacent. Screenings and steam sizes advanced about $2 a ton during this period. Standard went from $1.25 for domestic lump on Sept. 1 to $3.50 on Dec. 1. Steam sizes from this field advanced $2 a ton and screenings from 85c. to $3 during the same time. The market on Sept. 1 was:

	Williamson and Franklin	Mt. Olive and Staunton	Standard
6-in. lump	$1.75	$1.35	$1.20
3x6-egg	1.75	1.35	1.20
2x3-nut	1.75	1.35	1.20
No. 2	1.50	1.25	1.10
No. 3	1.40	.....	.....
No. 4	1.35	.....	.....
No. 5	1.00	.....	.....
Screenings	1.00	.90	.85
2-in. lump	.....	1.15	1.00
Steam egg	.....	1.10	.95
Mine-run	1.25	1.15	.95
Washed No. 1	1.75	1.60	1.50
Washed No. 2	1.60	1.50	1.40
Washed No. 3	1.50	1.30	1.30
Washed No. 4	1.40	1.20	1.20
Washed No. 5	1.00	.75	.75

With a good market in sight the idle mines began to open up. This brought about a shortage of miners and mine labor and helped the gradual rising tendency of the market.

About this time the operators in the Standard field, realizing the benefits of coöperation in ascertaining operating and distributing costs as practiced by the other operators' associations, got together and worked out a plan that materially helped to prevent an overproduction

of sizes not in general demand and concentrated their efforts upon getting better facilities for a more equal distribution. This brought about an easier condition in St. Louis for the user of steam sizes, but on the other hand resulted in firmer prices both for steam and domestic. It broke up the retail faction here that played the market against the operator, and as a result the public found coal much higher in the fall months than the dealers had promised in the summer.

Inquiries from New Markets

As a rule, in past years the public stored its winter's supply of coal in the summer months. The extreme heat of the past summer caused the retailers to fail to urge this delivery and an unprecedented call for household fuel late in August and the fall resulted. This helped to maintain a brisk local market. With an ever increasing car shortage the market became a paradise for the jobber.

A serious condition of affairs set in in November, when the market was cleared of coal for shipment to points East as far as Toledo and central Ohio cities, Detroit and Michigan manufacturing centers and the intermediate territory of Indiana.

Buyers from points close to Louisville and the coal fields of Kentucky, Tennessee, Alabama, Oklahoma and Kansas invaded the market. The nonproducing coal states of Texas and Nebraska, that in the past had depended mainly on other fields, also drew on the resources of the St. Louis market. With an increased demand from Iowa, Minnesota, Wisconsin and the Dakotas brought about by inadequate Lake shipments, there were times when several big retail yards had no coal for days and steam plants were sorely beset for fuel. Embargoes and car restrictions helped the local situation, but it was always a day-to-day proposition.

Like other coals, anthracite shipments fell off early in the season and when the call came it was too late. The tonnage of this coal declined perhaps 50 per cent. in this market on account of inability to secure it.

The early months seemed prosperous for a large smokeless tonnage, but a delayed demand sent all hopes of that glimmering when Aug. 1 arrived. The receipts of Arkansas semi-anthracite were small for the same cause.

These fuels have largely been supplanted with local byproduct and gas coke. Conditions have proved an extraordinary blessing to the local coke people not only here, but throughout the territory west to the coast. They carry about a year's supply of coking coal on hand, but were handicapped in shipping on account of no cars. During the spring months their coal supply came down the Ohio and up the Mississippi in barges.

The Concluding Period

There was a slump a few days after Dec. 1 in St. Louis and the territory adjacent on account of a good car supply during the first week in the month and mild weather for the second two weeks. The market on Standard 2-in. lump dropped to as low as $1.75, with mine-run about the same and screenings at from $1.75 to $2 and $2.25. Mt. Olive, owing to large advance sales in the Northern markets, was enabled to make a better showing, but it got down to around $2.25 to $2.50. Williamson and Franklin County sold as low as $2.75 at the mines for St. Louis shipment.

About the 20th of the month the weather took a turn and prices began to go up, so that the last day of the year saw coal at about $4 for the territory surrounding St. Louis. St. Louis proper, however, did not and would not pay over $3.50. In the Northern market as high as $4.50 was obtained for coal moving through this gateway. The market would have undoubtedly been stronger were it not for the embargoes at Toledo, Detroit and other Northeastern points.

At the close of the year Standard was bringing $3.25 to $3.50 for 2-in. lump, 6-in. lump, screenings, mine-run and nut, while Mt. Olive was about 25c. better. The retail price at the close of the year was: Williamson and Franklin County, $4.75 to $5; Mt. Olive, $4.50; Standard, $4.25; anthracite chestnut, $10; egg and stove, $9.75; grate, $9.50; smokeless, $8.25; gas-house coke, $6.75, and byproduct, $7.50.

Wholesale prices were per short ton f.o.b. mines with a rate of 72½c. for Williamson and Franklin County, and 57½c. for the other fields:

	Williamson and Franklin	Mt. Olive and Staunton	Standard
6-in. lump	$3.50	$3.50	$3.50
3x6-in. egg	3.50	3.50	3.50
2x3-in. nut	3.50	3.50	3.50
No. 2 nut	3.50	.....	.....
No. 3 nut	3.50	.....	.....
No. 4 nut	3.50	.....	.....
No. 5 nut	3.25	.....	.....
2-in. screenings	3.50	3.50	3.50
2-in. lump	.....	.....	3.50
3-in. lump	.....	3.50	.....
Steam egg	3.50	3.50	3.50
Mine-run	3.50	3.50	3.50
Washed No. 1	3.50	3.50	.....
Washed No. 2	3.50	.....	.....
Washed No. 3	3.50	.....	.....
Washed No. 4	3.50	.....	.....
Washed No. 5	3.25	.....	.....

Changes and Reductions in Coal Consumption

The steam market continues to a gradual curtailment of steam tonnage. The Keokuk Power Co. is recruiting new users among the small power plants for about 8 mo. of the year. For heating in the winter coal is used, but these plants were most valued for their summer demands. Several buildings in St. Louis have gone over to the centralized heating stations, and certain groups in the same city blocks have shut down their plants.

Oil continues to increase its hold, ousting coal in some of the big industrial plants. This is usually where producer gas was used.

The past year showed a marked decrease in the call for coal at harvesting and threshing time. In former years the harvest call for coal was an encouraging lift that proved a lifesaver for the coal industry. The gasoline tractor and thresher has almost eliminated the coal burner, and in the next year or two coal will not be used at all.

While gas-house coke has been made in St. Louis for many years and a fairly good domestic business has been built up, byproduct is practically a new proposition. The production per day of gas-house coke is about 250 tons, or 91,500 tons for the year 1916. This is practically all consumed within the city or its immediate vicinity.

Byproduct coke is prepared for foundry, smelting and domestic purposes. The tonnage for 1916 averaged 700 per day, or 256,200 tons for the year. The market has been exceptionally strong and a ready demand has prevented any surplus from accumulating at the ovens or elsewhere.

The Year at Cleveland

During the past twelve months the Pittsburgh No. 8 district, which is mostly controlled by Cleveland operators and supplies most of the Cleveland market, has experienced some strenuous times. In December, 1915, and January, 1916, the greater part of the output of this district was shipped to Buffalo and Rochester, N. Y., and to points in the New England states at prices which at that time appeared attractive, mine run and three-quarter lump bringing $1.40 and $1.50 per net ton at the mines.

It was the first time in the history of the district that this coal went into the New England markets, and as the prices were higher than the local market was paying, large shipments were made. But it was not long before the Eastern railroads were placing embargoes against this coal, which forced it into the Buffalo and Cleveland markets; about the middle of February prices started to tumble. By Mar. 1, No. 8 mine-run and three-quarter lump was selling at $2 per net ton f.o.b. Cleveland, which is on the basis of $1.10 at the mine. Slack was bringing an average of 10c. per ton less.

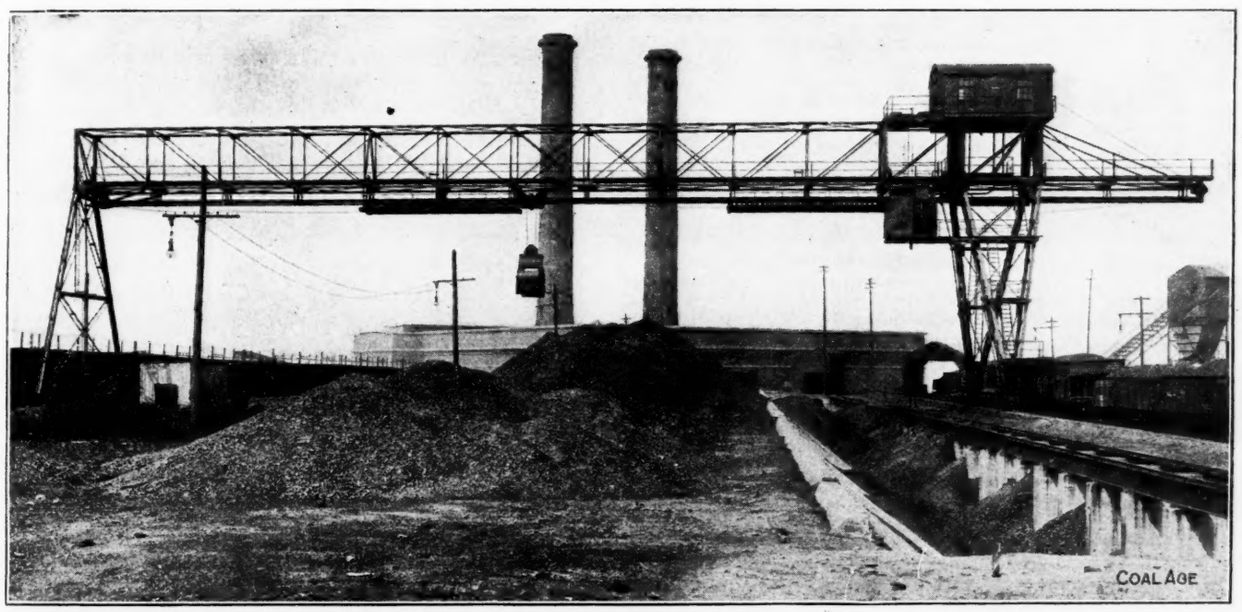
These prices prevailed practically during the entire month of March, with a small tonnage moving, and about the first of April they eased off a little, the average for the month being: Three-quarter lump, $2; mine-run, $1.90, and slack, $1.80, all per net ton f.o.b. Cleveland.

The month of May did not see any improvement in local prices, but on account of a short strike in the Pittsburgh and Youghiogheny districts, quite a large tonnage of No. 8 coal was shipped to steel companies at Pittsburgh and to points in the Mahoning and Shenango Valleys, which brought the following prices: Slack, $1.25; mine-run, $1.40, and three-quarter lump, $1.50, f.o.b. the mine. It was the first time in many years that No. 8 coal was shipped into that section, and it reminded one of the old saying, "Carrying coals to Newcastle."

On June 1 the Lake shippers started to load boats, and while this business increased shipments from the mines materially, it did not help prices to any extent. July showed a little improvement in prices, the following being the average paid on the Cleveland market: Slack, $1.90; mine-run, $2, and three-quarter lump, $2.10.

Soon after Aug. 1 large dock owners from the Northwest appeared in Cleveland looking for free coal and vessels in which to carry it to their docks. Up to that time they had only received small shipments, principally for the reason that they would not pay the Lake freight rate demanded by the vessel owners. This had a tendency to strengthen the local market to some extent, but it still was not difficult to secure liberal shipments from the mines, as the car shortage had not as yet been felt. The following were the average prices for the month of August: Slack, $1; mine-run, $1.20, and three-quarter lump, $1.30, all per net ton f.o.b. the mine.

Early in September the car shortage became a factor in shipments from the mines. This fact, together with the information from the Northwest that the docks would be short of fuel the coming winter, unless their shipments were increased to a large extent, started prices on an upward plane; and at the close of the month No. 8 mine-run and three-quarter lump were bringing $1.75 at the mine and slack $1.50.



A BROWN HOIST OPERATING AT ONE OF THE LARGE CLEVELAND DOCKS

The Strong Market in the Fall

An acute car shortage in October and a still greater demand for coal for Lake shipment wiped out the differential between slack and coarse coals and kept the prices jumping higher every day, until at the close of the month all No. 8 district coal was bringing $5 per ton at the mine. During this month there was also a large demand for No. 8 coal for the Mahoning Valley district, which is usually supplied from the Pittsburgh and Youghiogheny districts. On account of the lack of cars many industries there were forced to shut down. Another factor that tended to boost local prices was the fact that more than 200 manufacturing plants in this vicinity were forced into the open market for coal, owing to the failure of the natural gas supply on Oct. 31.

The high prices prevailing on Nov. 1 alarmed the general public and the newspapers, and Federal, state and municipal investigations were started at Cleveland. As a result prices began to decline and at the close of November they were about as follows: Slack, $4.50; mine-run, $4.75, and three-quarter, $4.75 per net ton f.o.b. Cleveland.

With the start of December it seemed that local market prices would not go any lower as a result of the poor car supply, but the railroads placed so many embargoes that it greatly restricted the points to which shipments could be made. This, together with the mild weather, forced prices still lower and on Dec. 6 they were as follows: Slack, $3.90; mine-run, $4, and three-quarter lump, $4.10, per net ton f.o.b. Cleveland.

On the whole, 1916 has been the best year ever experienced by the Pittsburgh No. 8 operators since the district was opened, and the outlook for the coming year is for a large tonnage and good prices.

Changes in the Trade

The most important changes in the Cleveland coal trade in the past year were as follows:

The Allegheny Coal Co. sold its Harwick mine and property located in Allegheny County, Penn., to the Philadelphia Co., of Pittsburgh.

The Virginia Hill Coal Co., with mines in Belmont County, Ohio, was reorganized under the name of the Cleveland-Belmont Coal Co., with A. W. Ellenberger, president, and R. A. Groch, sales manager.

The Lake Erie Coal Co., Inc., of Buffalo, N. Y., opened its Cleveland office Jan. 1, with R. S. Bain, sales agent in charge, and George O. Gray, formerly with the Bakewell Coal Co., representing the company in its sales territory.

The Wright & Zehner Co., operating mines in the Bergholz district, was taken over by local banking interests and Samuel H. Needs, formerly with the Ohio & Pennsylvania Coal Co., placed in charge.

The Henderson Coal Co., of Pittsburgh, Penn., opened a branch office in Cleveland and Arthur Newman, formerly with the Jefferson Coal Co., was appointed sales manager.

L. H. Lang, salesman for the Stillwater Coal Mining Co., was appointed manager of that company, replacing F. C. Arndt, who was elected treasurer of the Ackerman Wheel Co.

The Russell Coal and Mining Co. sold its mines and property to W. H. Warner & Co. The mines are located in the Pittsburgh No. 8 district, Jefferson County, Ohio, on the Pennsylvania Lines.

Rocky Mountain Coal Mining Institute

The sixth semi-annual meeting of the Rocky Mountain Coal Mining Institute, to be held Jan. 22-24 at Denver, Colo., offers an interesting program to those who expect to attend. As it takes place during Stock Show week, it enables one to visit this exhibit, which it is claimed is the biggest and best of its kind in the country. Another advantage of the meeting being held at this time is that it permits the members and their friends to profit by the low railroad rates which are granted for this occasion on all roads leading into Denver.

On Jan. 22, at 10 a.m., a business session will open the meeting at the Albany Hotel, followed by a paper by Prof. J. C. Roberts, of the Colorado State School of Mines, on "Mine Fires."

At 2 o'clock in the afternoon members and ladies will meet at the Stout St. entrance of the Albany Hotel, from which point the party will proceed in automobiles to the various manufacturing plants of the Denver Gas and Electric Light Co.

At 8 p.m. a visit to the Boxing and Wrestling Tournament of the Denver Athletic Club is planned, the ladies attending the theater.

On Tuesday, Jan. 23, at 9 a.m., a paper will be read by Samuel Dean, mine inspector of the Victor-American Fuel Co., on "Methods of Working a 3-ft. Seam of Coal Pitching 10 to 20 Deg."

At 11 o'clock a trip will be made to the Puritan mine, where lunch will be served, those attending being the guests of Harry Van Mater, president and general manager of the property.

At 8:15 p.m. members and ladies will visit the Stock Show.

On Jan. 24, at 9:30 a.m., a paper will be presented by D. D. Dodge, superintendent of the Carbon Coal and Coke Co., Joseph Smith, coal mine operator, and Henry King, deputy state coal mine inspector, the subject being "Mine Ventilation and Its Application to Economical, Safe and Modern Mining." The election of officers will follow, after which the meeting will adjourn.

The United States Geological Survey

By George Otis Smith*

The popular interest attaching to the geologic search for petroleum and the consequent large demands made upon the United States Geological Survey for field investigations connected with this subject have not led to any notable decrease in the attention paid to the subject of coal.

Anyone studying the industrial position of the United States among the nations of the world must realize how much is dependent upon this country's unsurpassed resources of coal. The Federal Survey therefore is continuing its intensive study of the coal problem that began with the general report published 15 years ago, on the coal fields of the country.

That review of our coal resources and their economic possibilities was planned by the late Dr. Hayes and served to outline the most promising fields for geologic exploration and investigation. The increasing importance of this subject is, perhaps, best measured by the increase in production during the period since that first country-wide study. In 1901 the total output of coal, both bituminous and anthracite, from the mines of the United States was 293,000,000 tons as contrasted with more than 600,000,000 tons output for the year just closed.

This phenomenal growth of the coal industry lends special interest to the general report on the coal fields of the United States which the Geological Survey has now in preparation as Professional Paper 100. The first part of this paper is a general introduction by Marius R. Campbell. This part, now on the press, includes a discussion of the ranks of coal and the classification and

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general description of all the coal areas of the country, with estimates of the original coal content of each field.

It is gratifying to find that this stock-taking, which results in estimates of the country's fuel reserves, yields tonnage totals considerably larger than those of the earlier estimates. Mr. Campbell also brings out the comparison of the wealth of the United States in coal with that of the other countries of the world; possessing 51 per cent. of the total coal of the world this nation has a marked advantage over other countries in the development of all those industries in which coal or coke plays an important part.

Later chapters of Professional Paper 100 will discuss individual coal fields, and it is fortunate that the state geologists of nine states have agreed to coöperate in the preparation of the descriptions of the coal in their respective sections. The first one of these state chapters to appear will be Ohio.

The fieldwork of the Federal Survey during the past year has included the geologic examination of 1100 sq. mi. in the Eastern States, while in the public-land states the detailed field examinations have yielded data for the classification and valuation of about 360 sq.mi. of public coal lands, this work being a part of the land classification activities of the Geological Survey.

In the Survey's statistical work connected with the coal industry one notable advance for the past year was the collection and publication of monthly statements showing the comparative figures of shipments of bituminous coal and coke over about 50 representative railroads. This move has been taken in recognition of the public need for prompt, even though only approximate, data regarding the rate of production of coal which more than any other one mineral product is believed to indicate correctly the trend of general industrial conditions. These monthly statements are made public on the 15th of each month and cover the previous calendar month with comparison of the same month of the previous year as well as of the month immediately preceding.

Another new feature has been the description of the distribution and consumption of coal in the Geological Survey's annual statistical report. In Part B of the coal report Mr. Lesher, in charge of the coal statistical work, describes the distribution of both anthracite and bituminous coal and gives interesting statistics on the consumption of coal by the different industries, showing also the consumption of coal by states, and in terms of both population and area for the different fields.

Three First-Aid and Mine-Safety Training Conferences

H. M. Wilson, chairman, department of inspection and safety of the Associated Companies, issued the following letter Jan. 1:

At first-aid and safety meets at various places in Pennsylvania last summer a number of mine operators suggested to me the advisability of a state-wide conference for the purpose of better organization of first-aid and safety training and for the regulation of the contests by which that training is fostered and rewarded. At the request of several, I agreed to endeavor to bring about a conference. The plan met the ready and hearty approval of the director of the Federal Bureau of Mines, who suggested that the project be extended to include all interested persons in Pennsylvania.

With this object in view, it is proposed that the mine operators, state mine inspectors and representatives of the miners and others interested meet for general conference in the Green Street School, Hazleton, Penn., at 10 a.m., Friday, Jan. 12, 1917; in the Fort Stanwix Hotel, Johnstown, Penn., at 10 a.m., Saturday, Jan. 13; and in the Fort Pitt Hotel, Pittsburgh, Penn., at 10 a.m., Monday, Jan. 15, 1917.

You are invited to be present or to send representatives with power to act for you. The meetings are called to arrange for the annual holding within the larger mining companies of a series of first-aid and safety contests and demonstrations. It is proposed that arrangements be made whereby these and smaller companies may send their representatives to district or county meets, the winners of these latter to attend a state meet, from which the winners may be sent to the Triennial International Mine Safety Demonstration to be held in Pittsburgh in September, 1917, on the occasion of the dedication of the new Bureau of Mines buildings and grounds. These meetings are also called to consider the rules and conditions under which such meets and contests shall be held and judged and to discuss the establishment and management of central safety and rescue stations.

I am authorized to send this invitation by Director Manning, of the Bureau of Mines; by Chief Roderick, of the Department of Mines of Pennsylvania; by the National Safety Council, by J. M. Francis, president of District No. 1 of the United Mine Workers of America; by certain unaffiliated miners and by the following mine operators who have conferred with me regarding this subject: J. B. Neale, president, Buck Run Coal Co., Minersville, Penn.; T. M. Dodson, vice-president, Locust Mountain Coal Co., Shenandoah, Penn.; H. G. Davis, general superintendent, Delaware, Lackawanna & Western R.R., coal department, Scranton, Penn.; W. R. McTurk, president, McTurk Coal Co., Girardville, Penn.; W. A. Luce, general superintendent, Ellsworth Collieries Co., Pittsburgh, Penn.; M. J. Bracken, general superintendent, Tunnel Coaling Co., Gallitzen, Penn.; George Whyel, president, Whyel Coal Co., Uniontown, Penn.; John Gibson, Jr., general manager, Merchants Coal Co., Boswell, Penn.; W. D. Keefer, president, Pittsburgh Terminal Railroad and Coal Co., Pittsburgh, Penn.; E. C. Brown, general superintendent, Pennsylvania Coal and Coke Corporation, Patton, Penn.; S. A. Taylor, president, Crescent Coal Co., Pittsburgh, Penn.

It is hoped that those who employ unorganized labor will also arrange for the attendance of one or more of their miners or companymen who are interested in first-aid and mine-rescue work. Please advise me whether you will attend.

General Labor Review

The principal events of the week are the granting of a 10 per cent. bonus announced by the central Pennsylvania operators to date as from Jan. 1. The Berwind-White Coal Mining Co. has given a 10 per cent. increase to its miners which apparently has been in force since the middle of December. Furthermore, that company, which operates in Somerset and Cambria Counties, the Lochrie Coal Co., of Butler County, and some coal corporations operating on the Pennsylvania R.R. in Allegheny County, have changed the length of their working schedule from 10 hr. to 9 hr. per day.

News also comes from the Thacker coal field of West Virginia, which lies southeast of Williamson on the western borders of the state, to the effect that the operators are about to grant a 10 per cent. increase in wages. The Williamson Coal Operators' Association, which met on Friday, Jan. 5, decided on this advance but no one would give details of the new schedule nor announce the time at which it would come into effect.

There is little or no agitation in the Pittsburgh district for an increase in wage, and it appears that the strike that threatened will not come about. This recognition of the inviolability of contracts is all the more reason for the operators taking a generous view of the situation.

In Somerset County Judge Ruppel, of Somerset, recently issued warrants for the arrest of 12 of the United Mine Workers at Hooversville on a charge of contempt of court. It is stated that these men violated the order of Judge Ruppel which required them not to interfere with the men who were working at the Knickerbocker Smokeless Coal Co.'s mines. The court declared the men guilty and the case will probably be carried to the Supreme Court as the officials of the United Mine Workers of America desire to establish their right to interfere with working miners in all such cases.

Coal-Gas Plants in the United States in 1915 produced and sold 336,213 gal. benzol, drip oil and holder oil, valued at $28,281, an average value of 8.4c. a gallon. Benzol products recovered in connection with the manufacture of byproduct coke amounted to 16,600,857 gal., valued at $7,337,371, an average of 44.2c. a gallon. It is thus seen that coal-gas plants are negligible as a source of supply of benzol products.

Editorials

Insurance in West Virginia

The purpose of insurance is to guarantee the insured that in the event of a certain thing happening he will receive a certain sum of money, usually as a compensation for a loss. The insured expects to pay a fixed sum, dependent on the risk, so that in the event of loss he will be paid a compensation that will at least in part indemnify him for his misfortune. He does not expect to have to reimburse the insurance company at any later time.

The plan which has just been described may well be called real insurance, but workman's compensation "insurance" in West Virginia cannot justly be so described. An accident occurs; the insurance body—in this case the state—pays the requisite compensation, and next year the insurance carrier is required to pay a large premium so as to reimburse the state for the money it has expended and will have to expend. So in West Virginia there is not, properly speaking, any insurance.

It is true the burden is but slowly loaded on the back of the coal company, which is thereby saved the shock of the catastrophe, but the pack is nevertheless placed on every insurance carriers' shoulder; he is as it were, self-insured. The load is not spread on the backs of all. It is not based on the physical condition of the mine, but wholly on the past record of the operation. The mine has had accidents and the mine must pay the bill.

Last year you had a surgical operation. It may have been the removal of the appendix, which, once taken off, can trouble you no more. The operation may have been of such a nature that it left no predisposition to accident or ill health. You expect, of course, to maintain your old rate of insurance. You do not anticipate that the evil experience will cause an increase in your rate. The loss will be spread, in fact being anticipated has already been spread, over the whole body of the assured. That is insurance.

Now if the insuring company—but what a folly to make such supposings—were to raise the rate so as to make you pay back in the next few years what you received from them for operating fee, for nursing, for hospital expense, for convalescence and for medical attention, if the company showed a disposition having received money for insurance to make you pay thereafter both insurance and indemnity for past payments, then it would not appear to you that you really were insured. Especially would this be the case if they had a contract with you by which, no matter what charge they made thereafter, you could not withdraw till in some way you had redeemed that indemnity.

Now this contract into which you were entered would make you careful to avoid accidents. You would practically be carrying your own insurance. And the West Virginia workmen's compensation plan has all the virtues of self-insurance, or will have as soon as the method of computing it becomes understood.

It has, therefore, some considerable merits. If we say it is not insurance at all, we do not necessarily wholly condemn it. Perhaps in the interests of safety it is better that the burden should be placed on the backs of those who create that burden, or should we not rather say permit it to be created. At least that seems a reasonable argument, so long as the workingman under the arrangement is assured of his compensation. It insures him, if not the coal or other industrial company.

However, the project may run against a snag. What would happen if a company too heavily burdened by a bad record lay down under the load and decided to go out of business, or became bankrupt and could not carry it? This eventuality is quite likely to happen. It is the nightmare of self-insurance, somewhat mitigated, however, by the fact that eventually the state or the other corporations would have to pay the bill.

On the other hand in Pennsylvania and Kentucky there is real insurance of mine hazards. There the insurance rate is based on the mining conditions alone. Certain safety provisions assure certain reductions in the insurance rate. No accident in the past affects the rating in the future. The insurance is so perfect theoretically that no one need care to secure real safety nor to protect the insurance company against fraudulent claims. This is not wholly true of course.

The inspectors, on whose scheduled description the insurance rates depend, in judging whether the roof hazard is great, will inevitably be guided by the past experience with that roof. They will also recall that the coal dust has in certain regions claimed many lives. They will judge the moral hazards perhaps as much by the records of the mine as by the schedule of the safety-first clubs and the number of meetings held to consider the elimination of hazards. The inspectors will not be like jurymen, who are chosen for their ignorance of all the facts at issue except those submitted to them. They will know bad roof, not so much by observation as by statistical record, as one would tell a head hunter not by his eye but by the skulls ranged along his fence.

It would appear that a little of the Pennsylvania system should be adopted in West Virginia and that a little of the West Virginia system might be profitably introduced into Pennsylvania and Kentucky. The self-insurance features of the Mountain State and the basing of the rate on the conditioning of the mine in the Keystone State are both good, and together would be sure to be successful in producing the best results. The inspection feature, which is part of the Pennsylvania scheme—for every mine must be inspected where the rate is based on the condition of the workings—is well worth its cost. It is almost as valuable in mine service as in the operation of boilers and elevators.

It is only fair, however, to urge the advantages undoubtedly to be found in the Pennsylvania plan. There is little question but what having to pay for the maintaining of a risk as in Pennsylvania and Ken-

tucky will often cause us to avoid it. Suppose the average distance a man can tramp over the railroad ties without being killed by the passage of trains is 10,000 miles. Let us assume that the rate of compensation which the pedestrian desires payable in case of death is $10,000. Then the risk of walking over the ties is $1 per mile. The average man will run that risk willingly, but if he were given the choice of paying a dollar a mile for the privilege of "hoofing it" over the ties or of refraining and saving the money, most probably he would take the road or wait for the train and go in more comfort at less expense.

The man who walks the track is self-insured; no one will pay the loss his family will sustain if he is killed thus trespassing. If he were asked to pay a dollar a mile for insurance before hazarding the trip he would refuse to pay it just as the Pennsylvania mine operator is now refusing to accept risks for which he would have to pay in increased insurance rates. It would seem that the Pennsylvania system would be the most likely to prevent the risk from being faced. However, granted that the operator has done all that is desired of him, or has put his mine in a certain definite condition, on which his insurance rate is based, then seeing that he insures his workman and not himself, he is not so interested in taking care that accidents do not occur, or that claims are not paid which are invalid. That is where the West Virginia system has its great value.

Negligence No Bar to Compensation

The State Compensation Board of Pennsylvania has decided that although a man meets death in the mines as the result of gross, willful, almost criminal negligence, his dependents are entitled to compensation.

The case in question was one where a miner smuggled crude oil into the mine and secreted it there. He was killed by an explosion that occurred when he attempted to fill his lighted lamp with this highly inflammable fluid. The decision of the board admits that this man died as the result of his own willful negligence, but holds that he was in the course of his employment and consequently his widow is legally entitled to compensation.

Although not in all respects exactly comparable, it is interesting to note the difference between this ruling and that of the court in another state in a somewhat similar case. In this instance a miner had been severely injured in an explosion of dynamite and brought action against his employer, seeking damages and claiming negligence in that he had not been warned of the danger of using the explosive. The court held that failure to warn a human adult of average intelligence and understanding of the danger of tarrying in the vicinity of dynamite on the verge of detonation did not constitute negligence. The miner was consequently not entitled to damages for the injury sustained.

Both of these cases display a marked disregard of ordinary everyday common sense. Any man of mature years knows the danger of being near dynamic or other high explosive when it is about to explode. Likewise every adult human ought to know the peril of bringing an open flame into the proximity of gasoline or any oil containing a large constituent of readily volatilized hydrocarbon.

The disparity in the two decisions is probably due to the fundamental difference between "damages" and "compensation." Damages may be considered as reparation paid by one individual to another for or on account of a preventable injury. (The word "individual" as here used signifies a unit; that unit might be a person, a firm, a company or a corporation.) Compensation, in a broad sense, probably means some consideration, usually taking the form of a periodic stipend, paid by way of the state to an injured person, his heirs or assigns, by the industry in which he received his injury. In other words, organized society, in order to protect its unfortunate elements, levies a tax upon various industries; this tax is disbursed by society among those injured.

It would appear from the decisions cited that while willful disregard of rules, culpable or contributory negligence might form the crux of damage suits, they have no place in questions of compensation award.

Some Impending Changes in the New England Market

New England buyers are now finding the price differential so much in favor of deliveries all-rail that only those obliged to furnish a heavy volume of coal are arranging for water shipments. The difference in price alongside is also very marked between shipments of Pocahontas and New River and cargoes of Pennsylvania coal; in some cases it amounts to more than a dollar, and certainly there is no such difference in efficiency. One curious phase is that several large plants have been equipped with types of mechanical stokers that show particularly good results on coals originating in Pennsylvania, even those on which the ash content runs up as high as 10 per cent.

There are also rumors of some sweeping changes in the distribution of Pocahontas coal in this section. The purchase of one large distributing company is said to have been arranged for by one of the most important coal purchasers in the country, and should the tonnage indicated be actually withdrawn from New England it would make a serious reduction in the volume of standard coals shipped to that market. No announcements have been made, but it is rather significant that the Virginia shippers generally are coy about obligating themselves on 1917 business. If a change such as that indicated actually does take place, it will be interesting to see whether higher volatile coals via Hampton Roads increase their tonnage in that market.

This Annual Review Number

This is the largest and most complete statistical or review number of *Coal Age* that was ever issued. Notwithstanding the fact that we have devoted more reading pages to the year's reviews, we have been obliged through lack of space to carry a number of articles over until next week. It is impossible to avoid a last-minute rush in getting out an issue of this kind, and we, therefore, ask our readers to be lenient in their criticism if an error here or there shall have crept in. In some cases final figures are printed differing from the estimates of our correspondents. This is explained by the fact that later and more authentic information came to us by telegraph. We felicitate the industry on the best year in its history.

Coal-Mining Work of the Bureau of Mines in 1916

By Van H. Manning.*

SYNOPSIS—One of the main features of the work of the Bureau of Mines in 1916 was a study of coal-mine conditions in various parts of the United States, with particular emphasis upon explosion hazards. The article reviews in detail the experiments conducted by the Bureau at its Experimental Mine to determine some of the less understood conditions which modify mine explosibility.

The study of mine accidents, fires and explosions, the rendering of assistance and advice at mine disasters, and the sampling of coal mines have been functions of the Bureau of Mines since its inception. Likewise, much time has been spent in demonstrating the explosibility of coal dusts, the conditions governing their ignition, and the methods of limiting or preventing mine explosions.

Work along these lines was continued by the Bureau of Mines during the calendar year of 1916. An important development has been the study during the past year of mine conditions in many operating mines in Alabama, Tennessee, Kentucky, Illinois, Indiana, Wyoming and Pennsylvania, with special reference to explosion hazards. Not only the coal dust, but the road dust, rib and gob dust, the gas conditions, blasting methods and general mining methods have been studied, and samples of dust, mine air, and coal taken in order to compare conditions with those in mines in which fires or explosions had occurred and to guide the experimental work being done at the Bureau's experimental mine. Dusts have been examined with reference to moisture, ash content and fineness, and reports have been submitted to the operators of the mines in which samples were collected, in order that they might be able to take suitable action to lessen any danger revealed. The reports contain recommendations in regard to improvement in ventilation and blasting methods, decreased production of coal dust underground and less accumulation in the mine workings, and rendering the dust inert by watering or by covering with rock dust, supplemented by the erection of rock or shale-dust barriers designed by George S. Rice, chief mining engineer, and tested at the Experimental Mine near Bruceton, Penn.

In coöperation with one of the large western Pennsylvania operators the general application of rock dust as a substitute for watering has been tried under operating conditions. This work, which was begun under the immediate direction of the late L. M. Jones, is proving satisfactory, the important changes needed for more economical operation being the use of small grinding units and the application of the dust by mechanical methods.

Sampling of the country's coal mines has been continued, both in connection with mining investigations and in regard to possible fuel purchases by the Government.

Investigations of methods of timbering and support of roof have been carried on in the field to supplement the roof support testing conducted the previous year at the Pittsburgh station.

In coöperation with the State of Illinois, investigations into the matter of subsidence of surface from mining operations have been conducted in different coal-mine districts of Illinois, and a line of monuments on the surface have been placed over the mined and yet unmined areas of typical mines.

The explosion testing at the experimental mine, conducted under the general supervision of George S. Rice and immediate direction of the late L. M. Jones, succeeded by W. L. Egy, during 1916 comprised, in addition to the testing of coal dusts from various typical mines, the study of six factors governing the explosibility of coal dust, some of which were studied in 1915. These factors were as follows: (1) Size of dust particles; (2) quantity of loading, or amount of dust per unit of area, or space; (3) composition of the coal; (4) effect of wetting coal dust; (5) effect of presence of inflammable gas on ignition and propagation; (6) effect of wide rooms or places in starting dust explosions by shots.

Effect of Large Coal on Explosibility

1. Size of Dust Particles, Pittsburgh Coal—Tests made originally in the Pittsburgh gallery in 1909 and in 1915 in the experimental mine indicated that particles of dust larger than 20-mesh do not enter into an explosion except as they may prevent smaller particles from rising into the air. The coal for these tests was therefore crushed to a 20-mesh size with either 10, 20 or 40 per cent. to pass through 200-mesh. The amount of pulverized shale which it is necessary to mix with these dusts and with pulverized coal dust to prevent the propagation of an explosion started in a 50-ft. zone of pulverized coal dust, is shown in the following table.

	Percentage of Shale
Pulverized coal	75
20-mesh coal, 40 per cent. through 200-mesh	70
20-mesh coal, 20 per cent. through 200-mesh	60
20-mesh coal, 10 per cent. through 200-mesh	50

As will be seen from the foregoing table, the size of dust which may be present is of the greatest importance; hence in determining the explosion hazard from coal dust in any particular mine the size of the dust as well as the quantity per unit of area found at the face and along the entries back to the shaft or entrance to the mine is obtained by systematic sampling of the dusts on the roadway, ribs, roof and timbers, and screening tests made of these samples to determine the quantity of each size of dust particle.

2. Quantity of Loading, or Amount of Dust per Unit of Area, or Space—One of the inquiries which coal mining men always make is, "How much dust has to be present in order to permit ignition and propagation of an explosion, and is it possible to have so much coal dust present that an explosion would choke itself?" The necessity of determining some of the simpler factors prevented taking up questions of this character at the experimental mine until the past season. It is true that the determinations of the minimum quantity necessary

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to ignite and propagate an explosion have been made in galleries both in foreign countries and at the Pittsburgh gallery of the Bureau in 1909, but it was felt that the determinations might not be true in real mine excavations. Also it was not possible to conduct these tests in the early stages of the experimental work, owing to the fact that until more recently the coal ribs were exposed and there was a question as to how far dust from the ribs might be abraded and take part in the action. Later the portions of the mine in which standard tests were conducted were lined, the floor with concrete and the ribs and roof with cement mortar placed by a cement gun, so that all surfaces could be thoroughly cleaned removing beyond question the possibility of dust abrading from the ribs, roof and floor. The quantity of loading was varied from ½ lb. per ft. of entry (0.38 oz. per cu.ft. of air space) to 6 lb. per ft. (1.65 oz. per cu.ft. of air space) these tests being conducted with the standard Pittsburgh dust. Modifications in the figures must be made for other kinds of coal dust.

It was found that for loadings of 1 lb. per ft. (0.275 oz. per cu.ft.) of coal dust, and heavier loading, the explosibility is practically constant, but lower percentages of shale or inert dust are required to prevent propagation when the loading is less than one pound per foot, and strong propagation is obtained with pure pulverized Pittsburgh coal dust loaded at the rate of only 0.3 lb. per ft. of entry (0.83 oz. per cu.ft. of air space). In the Pittsburgh gallery tests and those conducted by J. Taffanel in France, ignition was obtained with a smaller quantity, but the quantity named is barely perceptible in an entry lined with cement, and would be inappreciable in an ordinary unlined mine passage.

As regards "superdusting," up to 1 lb. per lin.ft. of entry no lessening of the propagation was obtained. As 6 lb. per ft. is a very large quantity of dust, such amounts of dust of a fine character being rarely found in mines, it would seem that the possibility of there being too much coal dust present to propagate an explosion may be left out of practical consideration. It is expected that in the future further experiments on the maximum and minimum quantities of dust within a range liable to be found in commercial mines will be conducted.

3. Composition of the Coal—During the year many tests were made to determine the percentage of shale dust that should be mixed with coals of different chemical composition coming from different parts of the United States. The results on these different dusts will be reported in a bulletin now in the course of publication. The findings are too extensive to be given at this time, but in general it may be stated that dusts from coals with high ash or high moisture content, or dust from coals approaching anthracite in composition, require less admixture of inert dust to render them inexplosive.

4. The Effect of Wetting Coal Dust—To obtain information, confirmatory or otherwise of the tests conducted by the Bureau in 1909 in the Pittsburgh gallery, a series of tests was made in the experimental mine to determine the effect on explosibility of adding water to mixtures of Pittsburgh coal and shale. While in general there was a confirmation of the gallery tests, it was found that in the mine under conditions wetter than those contained in the gallery propagation occurred with equally high percentages of moisture, so far as the pure dust is concerned. These tests were conducted in the summer time and the mine was often dripping wet. In one case it was found that a mixture of 77 per cent. pulverized coal and 23 per cent. water (not including the water of composition in the coal) gave a very strong propagation. The mixtures which would not propagate for the various sizes of coal are given in the following table:

	Pulverized Coal	20-Mesh Coal 40 Per Cent. Through 200-Mesh	20-Mesh Coal 20 Per Cent. Through 200-Mesh
Without water.....	25 per cent. coal 75 per cent. shale	30 per cent. coal 70 per cent. shale	40 per cent. coal 60 per cent. shale
10 per cent. water.....	40 per cent. coal 50 per cent. shale	40 per cent. coal 50 per cent. shale	50 per cent. coal 40 per cent. shale
20 per cent. water.....	.....	80 per cent. coal	80 per cent. coal

5. The Effect of the Presence of Inflammable Gas on Ignition and Propagation—Tests were conducted with Pittsburgh coal dust and coal dust from various fields upon the effect of inflammable gas (natural gas) in the air current at the time of testing. Tests with 1, 2 and 3 per cent. of gas in the air current were made. It was found that the presence of gas materially increased the explosibility of coal dust and mixtures of coal dust, especially of dust approaching anthracite in composition. On an average it may be stated that 1 per cent. of natural gas will offset 5 to 10 per cent. of shale dust, or other inert dust, in the mixture; and hence in gaseous mines additional amounts of inert dust must be added to offset the presence of gas.

Secured Serious Explosion in a Wide Place

6. Effect of Wide Rooms or Places in Starting Dust Explosions by Shots—It has always been assumed that dust explosions were more liable to start in narrow places than in rooms. With a view of getting some information on this point some tests were conducted during the year in one of a group of adjoining rooms. This room was 20 ft. wide and 160 ft. long, and was connected by crosscuts, or breakthroughs, to the adjacent parallel rooms. A strong ignition resulted from a blownout shot, which spread to the adjoining rooms and out onto the butt entry when 20-mesh pure coal dust was used—that is, 20 per cent. of which would pass through 200-mesh—being scattered on the floor with a loading of 0.2 lb. per sq.ft. of floor space, which is equivalent to 0.55 oz. per cu.ft. of air space. The explosion traveled several hundred feet through the butt entry as far as the loading of coal dust extended, but in another test in which the entry had been freshly dusted with 6 lb. of limestone dust per foot of entry the explosion flame was extinguished after traveling along 100 ft. of the entry.

During the coming season it is expected to continue the tests of coal dust from various districts of the United States, on dust from the Crowsnest Pass coal field, and dust from certain Vancouver Island mines. Also it is planned to carry on additional tests in rooms, and tests of explosions originating in different places in the mine with reference to the entrance and face, and with different conditions of loading. As far as possible the kind of road dust, rib and roof dust found in the respective mines are duplicated in the point of size, quantity and character, so that the recommended precautions may be as practical as it is possible to obtain them.

The formal testing of flame safety lamps for "permissibility" which the Bureau has recently undertaken, has required a review of methods and the designing and installation of new equipment, as the result of previous experience in testing. This work is now being prosecuted.

Discussion by Readers

The Bruceton Test of Clearfield Dust

Letter No. 1—In the issue of *Coal Age*, Dec. 23, p. 1057, John Verner, former State Mine Inspector in Iowa, in discussing the "Explosive Combustion of Dust," makes some interesting remarks concerning the recent test made by the Federal Bureau of Mines of the coal dust taken from mines in the Clearfied (Penn.) district. Mr. Verner asks that, in all fairness, the Government officials explain in what way the conditions under which the test explosion was brought about differ from the conditions found in the mines where the dust was obtained. He refers to the suggestion offered in *Coal Age*, Nov. 25, p. 890, asking "Do such conditions actually exist in any of the Clearfield mines?"

In all fairness to the Clearfield-district operators, I feel with Mr. Verner that the Government experts should have made some explanation, because as stated by Mr. Verner, "If the bureau fails to account for this apparent discrepancy between the results of its test and those realized in actual practice, there can obtain no benefit to anyone, except it be to the insurance companies doing business in Clearfield County, who would use the results of the test as a strong argument to boost their rates."

What will surprise the operators and mining men of the Clearfield district, generally, will be to learn that it was considered necessary by the Government experts to make such a test. So far as my knowledge goes, there are no coal operators or mine officials in the Clearfield district who have contended that dust produced from Clearfield coal would not explode under conditions in which it was evidently placed at the experimental mine at Bruceton, Penn.

If the test was made in favor of insurance companies, which is hardly probable, it has failed in its purpose. Because, any practical mining man who has had any experience in the Clearfield-district mines during the past 30 or 40 years knows that the dust hazard in that particular field is practically *nil*. The natural moisture in the coal seams of this field has relieved the mine operators there of any anxiety on that score. Coal dust such as is unfortunately found in some other fields is, like explosive gas, conspicuous by its absence in the Clearfield mines.

What Is Claimed for the Clearfield District

The operators of the Clearfield district do not contend that dust produced from Clearfield coal, pulverized and dried out, will not explode when submitted to such a test as that given by the engineers of the Bureau of Mines. They do contend most emphatically, however, that such dust, or such dusty conditions do not and have not existed in the Clearfield mines, either at the present time or in the past 40 years of mining in that field. If it was the intention of somebody to prove anything different, the time and money in making the test have been wasted.

Clearfield mine dust, or rather dust crushed for the purpose from Clearfield coal, will no doubt explode under highly favorable conditions, such as were produced in making this test; but such conditions are not to be found in the Clearfield mines and never have been. So I ask, with Mr. Verner, Of what value was the test? As he has contended, the explosion test conducted by the Bureau of Mines, in this instance, can be of no practical value to mining men, for whom such tests should be intended, unless the circumstances surrounding the test are explained.

For my part, I would like to have the Government officials who arranged the test answer, for the benefit of mining men, the following questions:

1. Was the test explosion in the Bruceton mine brought about with the dust in the same condition in which it is found in the Clearfield mines, or by dust pulverized from coal obtained in that district and somewhat drier than in its natural state?

2. Were dusty conditions found at any time in the Clearfield mines?

3. Was this test explosion actually made to settle a disputed question of a possible dust hazard in the Clearfield district and, if so, were the parties to the contention mine officials or coal operators in the district?

Houston, Penn. FAIRPLAY.

Textbooks in Examination

Letter No. 8—Speaking of the use of textbooks in the examination of candidates for mine foremanship, it should be remembered that the average miner taking the examination has not received the mental training of a college graduate. His memory has not been trained in its most receptive period and by constant study to retain mathematical and chemical formulas and constants.

Since the ability to remember becomes a candidate's chief asset in examination, I want to ask, Should the miner, who has been debarred by economic reasons from the advantages of an early education, but who by hard study and the sacrifice of many hours of rest has succeeded in mastering the simple formulas of ventilation, mechanics and hydromechanics, be subjected to the same memory test in the examination as those who have received a good education? Should not all candidates, on this account, be provided with these formulas or have access during examination to books containing them?

Considerable difference of opinion exists in regard to the extent to which a candidate should be permitted the use of aids in examination. Members of examining boards are quite generally opposed to candidates receiving help of any kind in the examination. They reason that the proof of a candidate's ability to pass the examination depends on his answering the question without any outside assistance.

On the other hand it is claimed, as has been frequently stated in the columns of *Coal Age*, that the present system of conducting these examinations is not fair to all candidates, because practical mining men are not placed

on the same working basis in the examination as in the mine. The letter of Thomas Hogarth, *Coal Age,* Nov. 25, p. 896, was a strong plea in favor of allowing the use of textbooks in examination.

While believing that candidates should be permitted to have access to general formulas and constants in examination, I am opposed to the unrestricted use of what is generally understood by the word "textbook" at that time by candidates. My reasons are the following: A textbook, in the general acceptance of the term, is a book that gives authoritative instruction on all phases of mining, with the possible exception of mining law. Given the use of such a textbook, the average candidate could find an answer to almost any question that might be asked in the examination.

What All Candidates Should Know

Again, it will be generally conceded that candidates for an official position in a mine should be familiar with the kind of gases found, their properties, effects on life and combustion and their behavior; the removal of such gases from the mines; the conditions under which safety lamps are unsafe; the importance of ventilation and the appliances used in its production; the splitting of air currents and the means of directing and regulating the air; the general methods of timbering under different conditions in mining; the important requirements in respect to mine haulage; the methods of drawing pillars and, last but not least, how to render first aid in case of accident in and around the mine.

It will be generally acknowledged that all such information a candidate should be able to give without referring to a textbook. On the other hand, I frankly admit that no valid reason can be urged against the use by candidates in examination, of such a book or memorandum of formulas, constants and tables as is seemingly suggested in the excellent letter of Mine Inspector Cunningham, *Coal Age,* Dec. 23, p. 1058. My objection to textbooks in examination relates solely to the use of such books as teach the theory and practice of mining and include all sorts and sizes of books, from the pocket edition of the International Correspondence Schools to the 1100-page book of Caleb Pamely.

Rating Questions and Outlining the Examination

Before closing, allow me to state briefly one or two points that I should have mentioned in my letter on coal-mining examinations. Frequently, candidates find themselves near the close of a session with only sufficient time to answer one or two more questions. In that case, it would be a great help to the candidate to know which of the remaining questions would be allowed the greater percentage of marks.

I believe that a matter of equal importance to that of the use of a proper book containing formulas, etc., is that of each question being marked with respect to its relative value in the examination. Not knowing this, a candidate will often select a question that has a low relative value. On more than one occasion, I have known candidates who would have passed but for their unfortunate selection of the questions answered. I know of no reason why the number of marks allowed each question should not be stated in the paper given candidates.

In addition to the general outline of subjects that should be studied by candidates preparing for examination, as suggested in my previous letter, Jan. 6, p. 29, I want to add that examining boards would do well to recommend a course of suggestive readings, for the purpose of creating a wider interest in practical mining literature, by which mine officials would keep in touch with new ideas and methods of importance to the mining of coal.

Hackett, Penn. Alexander Waugh.

Coal-Mining Examinations

Letter No. 13—After reading the letter of J. W. P., *Coal Age,* Oct. 28, p. 729, in which he relates his experience in attempting to secure a certificate of competency to act as fireboss in Colorado, I feel that something should be said in defense of Sec. 40 of the Coal Mining Laws of that state.

The section to which I have referred and which J. W. P. condemns as having been "enacted to benefit a certain class," provides among other requirements that certificates of competency shall be granted only to men who have been employed in underground positions in the mines of Colorado for two years prior to the examination.

This law was enacted, as charged by J. W. P., to protect those practical mining men who have worked for at least two years in the mines of the state. I would ask, Is it not right that a state law should protect its own citizens and give them a prior right over men coming from other states and desiring official positions in the mine? The men coming from other states may be no less competent to hold such positions than the men who have worked in the mines of Colorado the specified time, but they are not as well acquainted with the coal conditions as the men who have worked longer in those mines and become familiar with what is required for the safe working of the coal.

While I do not doubt, for a moment, the ability of our friend to fill the position of fireboss satisfactorily, it seems to me that, in justice to the men employed in Colorado mines, he should have been willing to have stayed and worked the required time in the mines of the state, instead of going elsewhere in search of such a position. It is my belief that he made the mistake of his life, since the certified men in Colorado are the highest paid men of that class in the world. In my opinion it would be worth while for any man to dig coal for two years, when his chance for securing such a position is good.

Walsenburg, Colo. Robert A. Marshall.

Letter No. 14—In his Letter No. 4, regarding the kind of questions that should be asked in mine foremen's examinations, *Coal Age,* Nov. 4, p. 772, Thomas Hogarth treats, in a humorous way, the line of practical questions suggested by William Crooks in his letter, Sept. 23, p. 513. I agree with Mr. Crooks in his conclusion that examining boards should discard many of the questions now being asked in examination and substitute in their place those of a more practical nature and adapted to present-day mining.

In the main I believe that only such questions should be asked candidates in a mine foreman's examination as pertain to the practical operation of a mine from the standpoints of safety and economy. This would include questions relating to keeping the mine in normal condition and putting out the coal at a minimum cost. It is such questions as these that mostly present themselves

to a mine foreman engaged in the actual operation of the mine.

On the other hand, questions that require a knowledge of the higher mathematics and that bear little relation to the practical work of mining should be eliminated from the examination. Many young men fresh from the schools but having little practical mining experience would be able to answer such technical questions. That would not signify, however, that they were competent to take charge of a coal mine and operate it safely and economically.

When one glances over the lists of questions asked by examining boards in different states he is forced to the conclusion that the examination is often better adapted to test the capabilities of an applicant aspiring to a chair of physics or mathematics in some college, rather than that of a candidate for mine foremanship.

I regret to say that in many of these examinations, it appears the examining board has quite lost sight of the practical side of mining. In many cases such practical questions as will present themselves in the daily operation of a mine are discarded for more technical ones that seldom occur in a mine foreman's experience.

Dayton, Tenn. JOHN ROSE.

Recovering a Flooded Mine

Letter No. 1—In response to the inquiry of T. S. Almond, *Coal Age,* Dec. 30, p. 1101, regarding the probable condition existing in the workings of a flooded mine, permit me to say that very much will depend on the material forming the roof of the workings and the condition of the roof at the time the mine was abandoned. Mr. Almond states that the mine was practically new and in good condition at that time, but he does not say what was the thickness of the roof slate overlying the coal.

Supposing that this mine had been worked on the room-and-pillar system and, it being new, assuming that no pillars had been drawn in the rooms, which would throw an undue weight on the entry pillars, it is quite probable that the mine entries will be found to be in good condition. In the rooms that are driven wide, however, heavy falls of roof may have occurred; but this would hardly take place in narrow work, except where a thin roof slate is overlaid with coal or other soft strata. The water would then have a tendency to soften the slate, and if there was a parting between it and the coal, the slate would probably fall in the entries, although that would hardly be expected in case the roof slate has a greater thickness.

FLOODED MINES IN THE PITTSBURGH DISTRICT

In the Pittsburgh district I have seen water pumped from mines that have been flooded for periods varying from three to ten years, and the workings were found to be in good condition still. However, there was, in most of those mines, a drawslate that was taken down, leaving a good roof slate over the workings.

In my opinion, if the shaft or slope bottom has not been too badly cut up, as was the case in one or two instances in the Pittsburgh district, it would be cheaper and quicker results would be obtained by pumping out the water than to sink a new shaft and develop a new mine. Of course, this assumes that there are no extraordinary conditions, such as would result from a cave extending to a creek bottom or surface stream that would admit a large quantity of water into the mine.

The time and expense required to open and develop a new mine must be carefully considered in connection with the relatively small expense and shorter time required to pump out the water and ascertain the true condition of this mine. It is true that some chance must be taken in incurring this expense; but, even should the wide work in the rooms be found to be badly caved, it should be remembered that it will require a comparatively short time to open up new territory, provided the narrow work in the entries is still in fair condition.

Before attempting to answer this question, it would have been interesting to know the character of the roof, the thickness of the slate overlying the coal and the kind of material above the slate, as well as the system of mining employed. MAX.

Smithton, Penn.

Timbering After Machines

Letter No. 5—I cannot agree with either of the methods of timbering suggested in the letter of John H. Wiley, *Coal Age,* Dec. 2, p. 941. There is no safety when a man is compelled to load coal under roof that requires to be timbered with crossbars 10 ft. long, especially when the collar is supported by a single leg set a short distance from one end and held in place by a wedge, as he has described. Neither would there be greater safety secured by hitching one end of the beam into the coal while the other end is supported on a single leg. Such a plan could not be depended on when undermining the coal, particularly in pillar working.

If a roof requires crossbar timbering and the timber sets must be placed 4 ft. apart, each crossbeam should be supported on two legs and firmly wedged. My custom is to set the legs about 10 in. from the end, so as to give opportunity for a new timber to be set under the collar should one of the legs become bent or broken. By this means the broken leg can be replaced quickly without taking down the collar and making a complete change of timber.

It has always been my plan, also, to use wedges 4 in. thick above the collar, so that in case it is desired to employ lagging to support the roof, this can be done easily by inserting the lagging in the 4-in. space left above the collar. The lagging should extend about 12 in. over each crossbar, so as to permit a new timber set to be put in place, without disturbing the lagging, should the crossbar show signs of failing.

Mt. Braddock, Penn. GEORGE STOCKDALE.

Letter No. 6—My inquiry on this subject, *Coal Age,* Dec. 2, p. 941, seems to have stirred up considerable criticism and I hope you will permit me to add a few words in my own defense. I feel that these critics have not carefully considered the plan I suggested, which has certainly given good results under the conditions prevailing in our mines. I can say, also, that it has reduced the cost of timbering, as no helper is required in setting the timbers.

In the first place, this method was taught me by one of the best, oldest and most experienced mine foremen in the bituminous district—James Jeffreys, of this place. I

want to say that the method I described has been employed under the very worst conditions and has given complete satisfaction, an accident never having occurred in its use.

My custom is to visit each working place that the machine is to cut, distributing in each place as many collars and posts as will be needed. Having done this, I start to hew the collars and to make two wedges for each collar. By this time the miner will have cleaned up one side of his cut and, calling to him, "Mike, give me a lift," I soon have the post set under the collar, about 14 in. from the big end. The wedge is then quickly driven and the timber is in place. The whole job takes but 2 or 3 min.

Referring to the suggestion of "Timberman," in Letter No. 2, *Coal Age,* Dec. 23, p. 1057, in regard to cutting a hitch in the coal to support the other end of the collar, let me say that there is no assurance of safety in so doing. The hitch is liable to break out from the coal and cause an accident. I want it clearly understood that I return to each place and set the second post under the collar as quickly as the coal has been cut.

I believe that the cutting of a hitch in the coal will tend to increase the number of accidents. It will certainly increase the cost of timbering, as it will be necessary for the timberman to return and set the second post after the coal has been cut and before it falls.

Oliphant Furnace, Penn. JOHN H. WILEY.

Boost Rescue Work

Letter No. 2—In referring to the "constant occurrence" of mine explosions and the "crying necessity for the improvement of mine-rescue methods and equipment," William Crooks has drawn attention to "the great loss of life that so frequently occurs by reason of the long delay in rendering aid to those entombed underground."

In the same connection, I want to refer briefly to a similar "long delay" in restoring ventilation in a mine after an explosion has occurred that has wrecked doors, stoppings and overcasts. The delay in restoring the ventilation in a mine, under these conditions, keeps rescuers from reaching the entombed men, who often live for several hours behind a temporary brattice or barricade erected to exclude the poisonous afterdamp.

The building of stoppings is a matter of the greatest importance in this connection. Many stoppings are built in such a manner that even a slight explosion of gas or dust will throw them down and render the escape of men from the inner workings impossible, because of the short-circuiting of the air current, which passes into the return through the openings made by the destruction of the stoppings.

In my opinion many lives would be saved if more care was taken in the construction of the stoppings on the mine airways. I want to suggest that these stoppings should be built in a more substantial manner and in a way to resist the force of an explosion, except in extraordinary cases when, of course, nothing but the natural strata would be able to withstand the shock.

It may cost somewhat more to cut into the ribs so as to give the stoppings a good bearing that will prevent, as far as possible, its displacement by the force generated in an explosion in the mine. But, I want to ask, Would not the increased cost be amply repaid if it were the means of saving lives that would otherwise be sacrificed?

In my opinion all important stoppings should be substantially built of cement and reinforced with old rails or iron pipe that can generally be put to good use in this manner, instead of being thrown on the scrap pile or left in abandoned places to rust away or be covered up and lost in the waste. Generally speaking, there is a quantity of such material to be found in most mines that could be utilized in this way to save lives. AN OLD MINER.

Republic, Ala.

Training for Mine-Rescue Work

Letter No. 2—One feature of the rapid advance of the safety-first movement has been the development of competent rescue workers in nearly every mining district. But as mine accidents decrease in number, there is not the same opportunity afforded for these men to test their ability to perform the work required of them. For this reason, there is a growing need for the regular training of men whose duties will call them to perform such service in time of need.

Many of the cases presented in mine accidents are difficult propositions to handle properly in a contest or in the training of men. For example, it would be difficult to illustrate properly the performance of men in the treatment of the victims of an accident in which a limb has been torn from the body. In this connection, an excellent suggestion was made by a Kentucky correspondent writing of ways in which first-aid contests may be made more useful, *Coal Age,* Aug. 19, p. 312. This correspondent suggests the use of a dummy to take the place of a human subject, in cases where it is not practicable to employ the latter, as is done in most first-aid contest work.

MORE REALISTIC TRAINING NEEDED

Permit me to suggest that, in the case I have just mentioned where a limb is torn from the body, it would be well to make use of an articulated dummy whose limbs could be disjointed as desired. As suggested in the article to which I have referred, a dummy could be placed under a fall of roof slate or under a car that is off the track. The problem would then be to test the judgment of the contestants in respect to the best method to be employed in removing the victim from his unfortunate position.

Let me suggest further that contestants should have no previous knowledge of the kind of problem they are to be called upon to face, but should enter the room and be confronted suddenly with the question of rescuing the victim or treating his injuries whatever they may be. The quickness with which the contestants grasp the situation and respond to this call for help will determine largely their ability to perform such service when required in the mine. The problem could be made still more complete by marking the dummy in a manner to indicate a dislocated joint or a broken limb.

In this manner the training of men to engage in rescue work would be made more practical. Every move of the contestants should be closely watched and unduly rough handling of a broken limb or dislocated joint should be carefully noted by the judges. In this way only can the men be properly trained and taught to exert the necessary care in the handling of an unfortunate victim.

Peru, Ill. GASTON LIBIEZ.

Electric Substations in Mines

Letter No. 1—Kindly permit me to offer a few suggestions in reply to the inquiry of "Mine Manager," *Coal Age*, Dec. 30, p. 1101, who is anxious to ascertain the advisability of establishing an electrical substation underground and asks, "Would the establishment of a substation in a gaseous mine introduce an element of danger, provided the station was located on the main intake airway where a good current of fresh air is passing continually?" And, further, "What precaution should be taken in conducting a current of 2300 volts down the shaft and through the mine entries to the substation?"

Inasmuch as the establishment of an electrical substation in mines, particularly gaseous mines, is one of great importance at the present day, I hope that mining electricians and engineers will express their opinions freely. It is my belief that an underground substation can be installed and operated with a degree of safety in a gaseous mine. It is well known that many installations of this kind are in daily operation in the anthracite field, where the mines are nearly all classed as "gaseous mines."

When such a substation is constructed of fireproof material, preferably cement, and located where it can be ventilated by fresh air from the intake airway and is entirely cut off or isolated from the return current, which always contains more or less gas and dust, it does not appear to me that the arrangement would introduce an element of danger into the mine.

Safeguarding High-Potential Currents in Shafts

In regard to the question of what precautions should be taken to safeguard a current of 2300 volts passing down the shaft and through the mine entries to the substation, permit me to say that in all gaseous mines, high-voltage transmission lines or cables should be installed in intake airways only. The cable should be marked in such a way as to indicate its danger. The sign "Danger" should appear at frequent intervals along the line.

Most mine shafts are very wet, and the cable passing down the shaft is subject to severe conditions. It has been my practice, on this account, to use a cable having a higher voltage capacity than that required. For example, for the transmission of 2300 volts, I would suggest using a cable having a capacity of 6600 volts, to insure greater safety, which means greater economy in the end.

The shaft cable should be lead covered to a distance of, say 25 ft. or more to where the entry is dry. A drip-loop should be arranged in the cable at the bottom of the shaft, so as to prevent water running along the cable to where it is spliced to a smaller wire for extension into the mine.

Assuming a three-phase system, a three-way lead-covered cable should be installed for transmitting the current from the end of the shaft cable to the substation. The three-way cable should be hung on a messenger wire installed in the intake airway. In one of my recent installations I adopted this method, hanging the high-tension cable to the messenger wire by means of short cords, which makes a good job and takes up little space in the airway. The method not only presents a neat appearance, but prevents the possibility of injury to the cable, when not fully supported in this manner.

Too often there is observed in coal mines a slipshod method of wiring, which shows inefficiency and carelessness and, not only this, but such an installation increases both the fire hazard and cost of upkeep.

It may be asked, Why adopt an underground substation in a gaseous mine? I would answer, If the mine is extensive and more power is a prime factor in its operation, every feature should be carefully considered before deciding on the proper location of a substation, which may be as suggested, on the main intake airway. Or the power may be transmitted over the surface to a point directly above the inside workings in the mine. Here, a borehole can be sunk and the power conducted underground to the point where it is to be used. In this consideration, safety and economy of operation are the determining factors.

T. O. Hughes,
Electrician and Erecting Engineer.
Windber, Penn.

Mine-Accident Record

Letter No. 3—I recall an accident that happened to a mine examiner at West Lancashire, England. There was a block of coal between the intake and return airways, and it was decided to cut through this block so as to short-circuit the air.

Two men started cutting, one on each side of the pillar in order to get through quicker. When the cut had proceeded but a short distance in on the return side, the place began to make considerable gas and, the air-course being low, instead of putting up a sheet to move the gas it was decided to work on the intake side only and the place was fenced off on the return side.

A day or two later, the man cutting on the intake told the mine examiner he thought he was about through. The examiner replied, "You stay here and I will go to the other side and give you a sounding." On reaching the fence, he put his lamp on the floor and crawled in to rap on the face. That was the last of him, as he never got to the face. The gas ignited on his lamp and burned him so badly that they brought him out dead.

Another instance I recall was where a shotfirer caused an accident by disobeying the mine rules. The rule read: "All unused detonators must be returned to the office and locked in a cupboard kept for that purpose." Instead of obeying this rule, the shotfirer took one home, where his little boy got hold of it. While the child was playing with it the detonator exploded, blowing off two of his fingers, maiming him for life. I cannot but wonder what that man's thoughts are when he looks at his boy's hand.

I remember still another accident by which a man met his death through disobeying one of the mining laws. It was this man's duty to withdraw timber standing in the old workings. Instead of getting a prop and sinking it firmly in the floor and roof, he fastened his gablock chain to a prop already set and began to draw other props, which loosened the prop where his chain was fastened. A large stone fell on him killing him instantly. Before starting to draw timbers he should have first examined the roof all around him to make sure that it was safe. If not, it was his duty to make it safe. I wonder how many of our miners examine the roof in their places before starting to work? If this were done I think we would have fewer accidents from falls of loose slate.

Universal, Ind. Jacob Riley.

Inquiries of General Interest

Unwatering a Mine

In connection with a drainage proposition in our mine, I want to ask for an explanation of the theory of the flow of water through pipes or boreholes of various sizes and against different heads. Also, the theory relating to the design of brick and concrete mine dams.

——, Penn. MINE ENGINEER.

Assuming that the proposition is to unwater a mine by pumping the water through a borehole to the surface, it is important to observe that the pressure head, under which the pump must work, is equal to the discharge or gravity head plus the friction head due to the flow of water through the pipe or borehole. The friction head h_f, for any flow G (gal. per min.), through a pipe having a diameter d (in.) and a length l (ft.), under a discharge head h (ft.), is calculated by the formula

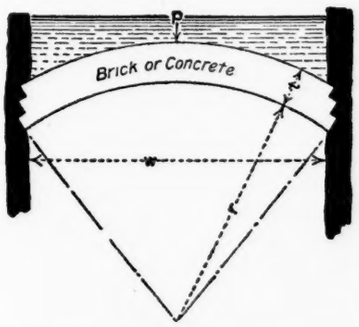
$$h_f = \frac{G^2 h}{800 d^5}$$

Thus, to discharge, say 200 gal. per min., through a 4-in. standpipe in a borehole 500 ft. deep,

$$h_f = \frac{200^2 \times 500}{800 \times 4^5} = say\ 25\ ft.$$

Adding this to the discharge head gives a total head against which the pump must operate of 500 + 25 = 525 ft. The pressure due to this head is 525 × 0.434 = say 228 lb. per sq.in., which is the required steam-cylinder pressure in the operation of the pump.

Replying to the second question, we suggest first, that in the building of a mine dam a place must be selected where each rib is in solid coal. As shown in the accompanying figure, the bearing surfaces of the brick or concrete arch forming the dam must be stepped into the rib on each side of the heading. The steps must be cut at an angle corresponding to the radius of the dam. The outer or shorter radius should not be less than the width of the opening and may be one and a half or two times that width. The thickness of such a dam to withstand a pressure p (lb. per sq.in.), in a width of opening w (ft.), when the shorter radius of the dam is r (in.) and the crushing strength of material S_c (lb. per sq.in.), may be calculated by the formula



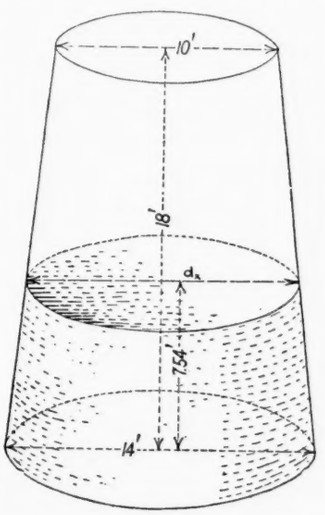
$$t = \frac{3pw\sqrt{4r - 1}}{S_c}$$

The safe crushing strength of concrete may be taken as S_c = 600 lb. per sq.in. Thus, the thickness of a concrete circular dam having a radius of 15 ft., to support a head of 500 ft., in a 10-ft. opening would be 290 in., or 24 ft. 2 in. By reinforcing the concrete this thickness can be much reduced.

Contents of Water Tank

Would you kindly favor me with the correct solution of a question asking for the depth of water in a conical tank when it is half full. The tank I have in mind, as shown in the accompanying figure, is 10 ft. in diameter at the top and 14 ft. in diameter at the bottom, while the height is 18 ft. The question has puzzled me for some time and I have been unable to find the correct solution.

M. J. COACHES.
Vestaburg, Penn.



The first step in the solution is to find the quantity of water the tank will hold when full, using the formula for the volume of a frustum of a cone. Calling the diameter of the larger section or base D, that of the smaller section d and the distance between the two sections or height of the frustum h, this formula is

$$Vol. = 0.7854h\frac{D^3 - d^3}{3(D - d)} \qquad (1)$$

Substituting the given values, h = 18, D = 14, d = 10, we have for the contents of this tank

$$Vol = \frac{0.7854 \times 18}{3} \times \frac{14^3 - 10^3}{14 - 10} = 2{,}054.6\ cu.ft.$$

When the tank is half full, it will therefore contain 1,027.3 cu.ft. Now, denote the required depth of water when the tank is half full by x; and, since the diameter decreases from bottom to top, 4 ft. in 18 ft., or 2 in 9, the diameter d_x at the surface of the water when the tank is half full will be,

$$d_x = 14 - \tfrac{2}{9}x \qquad (2)$$

Then, writing d_x for d, and x for h, in formula 1, gives for the volume of water in the tank when half full

$$\frac{0.7854x}{3} \times \frac{14^3 - d_x{}^3}{14 - d_x} = 1{,}027.3 \qquad (3)$$

It is now necessary to find the value of x that will satisfy formulas 2 and 3. The simplest method of doing this is to find this value of x by trial. It is known that, since the tank is larger at the bottom than at the top, the depth of water when half filling the tank will be less than half the height of the tank. A few trials show that the required depth of water is x = 7.54 ft., or 7 ft. 6½ in.

Examination Questions

Tennessee Mine Foremen's Examination

(Selected Questions)

Ques.—How many cubic yards in a shaft 37 ft. long, 12 ft. wide and 750 ft. deep?

Ans.—The cubic contents of this shaft is 37 × 12 × 750 = 333,000 cu.ft.; or 333,000 ÷ 27 = 12,333+ cu.yd.

Ques.—What are the dangers and consequent results arising from not having accurate and complete surveys of the workings of a mine?

Ans.—Where no accurate and complete survey is maintained, showing the extent and exact location of the workings underground, with respect to the property lines and other features on the surface, numerous difficulties will arise. The workings are liable to be extended beyond the property lines and coal taken out that does not belong to the company, giving rise to future lawsuits and claims for damages. The workings in different sections of the mine will often break into each other at points unexpected and possibly result in serious accidents.

Where special precautions are needed to be taken when driving underneath surface streams or important improvements on the surface, the absence of an accurate location of these features on the mine map will often cause serious trouble. The abandonment of a mine, before an accurate survey has been made showing the exact extent of the workings, will prove a menace to future operations in that vicinity, because of the adjoining workings being filled with water or gas.

Ques.—The tidal elevation at the head of a shaft is 864 ft., while on the rail at the bottom of the shaft it is 220 ft. What is the depth of the shaft? How much higher is the face of a gangway 1600 ft. long, than the foot of the shaft, if the tidal elevation at the face of the gangway is 236 ft.?

Ans.—The depth of the shaft, measured from the surface to the rail on the lower landing, is 864 — 220 = 644 ft. The elevation of the face of the gangway above the foot of the shaft in this case is, 236 — 220 = 16 ft.

Ques.—What forms the most dangerous kind of roof in coal mining in this state?

Ans.—The roof in many mines in Tennessee consists of a slate of varying thickness overlaid with sandstone. In many cases the roof slate becomes particularly troublesome and dangerous, partaking of the nature of a draw-slate that has a tendency to separate from the overlying sandstone and fall. Practically two-thirds of the fatal accidents in Tennessee mines are due to the fall of this roof slate, which may be said to form the most dangerous kind of roof in those mines.

Ques.—What is meant by a fault? Describe one that you have seen.

Ans—A fault, in geology, is a dislocation of the strata composing the formations. This dislocation is caused by a slip of one section of the strata along a line or fissure that separates it from another section.

In coal mining, however, the term "fault" is often improperly applied to almost any irregularity in the formation. Those most frequently occurring in coal formations are known to the miners as "pinchouts," "horsebacks," "pot bottoms," "washouts," "clay veins," and "slips." Of these, only the last named partakes of the true nature of a fault. Each candidate must describe one of these conditions that he has observed in his mining experience.

Ques.—What is the estimated tonnage per acre, per foot of thickness, for bituminous coal?

Ans.—Formerly, two rules were in general use for estimating the possible available tonnage, per foot-acre, in a given tract of land. In one case it was customary to allow 1000 tons of available coal per foot-acre in a level seam; while another rule made an allowance of 100 tons per inch-acre, which was equivalent to 1200 tons per foot-acre. Each of these rules, however, allowed for a considerable waste in mining and did not account for the screenings, which formed from one-quarter to one-third of the total output.

These rules are scarcely applicable to uptodate methods of mining or run-of-mine coal. At the present time, any careful estimate should be based on exact prospect records that show not only the thickness and inclination of the seam but the quality and specific gravity of the coal. Allowance should be made for a loss in mining and handling of, say 10 per cent., although this will vary with the difference in practice and equipment.

Ques.—To what extent are the following gases soluble in water: Carbon dioxide, hydrogen sulphide and marsh gas?

Ans.—At a normal temperature (60 deg. F.) water will dissolve practically its own volume of carbon dioxide; while at 32 deg. F. it will dissolve practically 1¾ volumes of the gas. At 60 deg. F. water will dissolve three times its volume of hydrogen sulphide, while at 32 deg. F. it will dissolve 4⅔ volumes of the gas. Methane and carbon monoxide are the least soluble of any of the common mine gases. At a temperature of 60 deg. F. water will dissolve about $^1/_{30}$ of its volume of methane. In other words, practically 30 volumes of water are required to dissolve a single volume of methane, at this temperature. At 32 deg. F. about 40 volumes of water will be required to dissolve a single volume of methane.

Ques.—Give the names, chemical symbols and compositions of the different gases met with in coal mines.

Ans.—The common mine gases are the following: Methane or marsh gas (CH_4), consisting of one atom of carbon combined with four atoms of hydrogen; carbon dioxide (CO_2), in which one atom of carbon unites with two atoms of oxygen; carbon monoxide (CO), where one atom of carbon is combined with one atom of oxygen; hydrogen sulphide, or sulphureted hydrogen (H_2S), in which two atoms of hydrogen are combined with one atom of sulphur. An important but less common mine gas is olefiant gas (C_2H_4), consisting of two atoms of carbon combined with four atoms of hydrogen. A still less common gas is ethane (C_2H_6), consisting of two atoms of carbon combined with six atoms of hydrogen.

Coal and Coke News

WASHINGTON, D. C.

An investigation into the cost of cartage within city delivery limits to find out how that service contributed to the higher cost of coal and other commodities to the consumers of the country is planned by the Department of Commerce. Secretary Redfield has announced the view during the past week that the cost of city cartage and local distribution of commodities by retailers represents an important factor in the high cost of living. This, he said, is borne out by the results of a preliminary survey which has been made by Director Rogers, of the Census Bureau.

In this connection the department made the following announcement:

"For four important classes of commodities—coal and wood, milk, ice and department-store merchandise—which together represent a considerable proportion of the cost of living, the expense of delivery, or cartage one way, according to the results of this preliminary survey, constitutes, on the average, more than 8 per cent. of the total cost to the consumer. The percentages for the individual commodities, however, vary greatly from this average. For department-store merchandise the delivery expense, as indicated by the data so far obtained, represents less than 2 per cent. of the selling price; for milk and dairy products the corresponding proportion is 12 per cent.; for coal and wood, 19 per cent., and for ice, 45 per cent.

"In view of the fact that intensive studies of the prices and general cost of handling many foodstuffs—for example, butter, wheat, flour and sugar—which have been made in recent years by city, state and Federal authorities show the various percentages that the several general handlings or transactions add to the original price received by the producer, the officials of the Census Bureau decided to confine the scope of their initial investigation to that phase of distribution represented by the final one-way delivery—that is, delivery by the retailer to the consumer—of necessaries of life and to the cost of cartage in other forms; and since in the case of many articles of food the amount received by the producer is only one-half or one-quarter (or less) of the price paid by the consumer, it was the belief of Secretary Redfield—a belief borne out by the results of the preliminary inquiry—that the item of city cartage alone would be great enough to justify calling attention to the large sums that the community is called upon to pay in maintaining the wasteful and highly complex systems of individual delivery which characterize retail distribution at this time.

"When it is considered that in the City of Washington alone there are no fewer than 5000 retailers of all classes who make deliveries of their various goods, and that the delivery service of these dealers ranges from the well-organized and highly efficient system of the large department store, at a relatively low cost, to the comparatively expensive—because small and poorly equipped—service of the corner grocer, which he is compelled by competition to maintain, it is apparent that this one form of the cost of city cartage represents an annual expenditure of millions of dollars, much of which could be saved by better organization. At any rate, the results of the preliminary survey are considered by Secretary Redfield to be sufficiently striking to justify him in directing the Census Bureau to make a further and more exhaustive study of the subject. This study will cover not only the cost of the final delivery from the retailer to the consumer, but also the cost of transferring goods from the railroad station to the store or delivery station (such as a milk depot), and also cartage costs as they appear in other connections. This expense is an item of importance, but it was not feasible to make any investigation of it in the course of the preliminary survey."

HARRISBURG, PENN.

Workmen in Pennsylvania, or their dependents, were assisted under the state compensation law to the extent of $4,372,156.97 during the first year of the operation of the state enactment. This is the aggregate sum paid out, or contracted to be paid out, under the law to employees not fatally injured or to dependents upon employees killed during the course of their employment.

Of this sum more than a million and a quarter of dollars has been paid in nonfatal cases, $147,281.54 was paid to dependents of employees killed in service, and these dependents are to get the additional sum aggregating $2,965,255.72 in payments as provided in the law.

From Jan. 1, 1916, to Dec. 31, 1916, there were 54,500 compensation agreements approved, which is in excess of the rate of 1000 a week.

Of these 53,259 were nonfatal accident cases and 1241 were fatal accidents. Compensation paid in nonfatal cases aggregated $1,259,619.71, and in fatal cases $147,281.54 was distributed to dependents. In addition $2,965,255.72 is the amount contracted to be paid to dependents in fatal cases, so that the total of compensation reaches the amazing sum of $4,372,156.97. The average payment of compensation in fatal cases is $2388. Refereees made awards in 479 cases, 220 were disallowed, 665 were discharged, 44 withdrawn and 332 are pending.

The figures show that 2587 persons were killed, nearly half of this number losing their lives in the coal mines. The total number killed and injured being 251,488, or an average of 215 killed and 20,957 killed and injured each month. October had the largest number of fatalities, showing 287, while March had the largest total killed and injured, there being in that month a daily average of 999 killed and injured.

Governor Interested in Mine Caves

That the mine-cave problem has a large place in the thoughts of Governor Brumbaugh, who realizes it is a serious menace to the nine anthracite counties of the state, is indicated by his message to the General Assembly.

Governor Brumbaugh in his message to the legislature at the opening session on Jan. 3 referred to the situation, declaring that it is a grave issue between property rights and human life, and later gave his views on the subject, in which he said that he would like to have a conference in the near future of all representatives from the nine anthracite counties, together with officials of all the coal companies and the attorney-general's office.

The governor is of the opinion that the solution of the mine-cave problem in the anthracite fields lies in an understanding between representatives from these counties and the owners of the property rights affected.

It is the first time that this problem has been brought to the attention of the legislature in a message from the governor. The governor states that he knows it is a difficult question, but says there is no problem that is not reducible to a solution if it is worked out with care. The state has a direct interest in the problem because of its experience at Scranton with the 13th regiment armory.

Governor Brumbaugh's message pertaining to the mine-cave situation, read before the House and Senate, is as follows:

"In nine populous counties of this commonwealth the mining of anthracite coal is conducted on a large scale. It is from that region that substantially all of this valuable fuel for the entire country is produced. In the aggregate it is a mighty industry and maintains a very considerable portion of our entire population.

"When title of these coal measures was acquired it carried with it the ownership of the surface. Later the owners of the coal land sold to others the surface rights and over these coal measures have sprung up great cities and other municipalities. In the removal of this coal the safety of life and of property on the surface is seriously menaced. Litigation has arisen.

"The courts have decreed that the right to remove the coal is inherent in the title to the coal lands. This, however, does not change the fact that the dwellers in these cities are increasingly in danger of loss of property and even of human life by reason of the settling of the surface as the coal is removed from beneath. It is a question of great importance. Property rights under law are directly at variance with surface safety.

"All the parties in interest sense the gravity of the situation. The commonwealth may well take note of it and seek some fair and equitable adjustment of the difficulty, having in mind the value of human life and its conservation as well as the rights of the owners of the coal. The state armory in Scranton has already been seriously damaged. Above $60,000 have been expended to underpin this structure, and the work is not yet completed.

"By compulsory law children of a certain age must attend school. In some cases schoolhouses are pronounced unsafe and several have been closed to avoid disaster. I urge you to give most considerate thought to this matter, and if possible find a means of resolving the difficulty in a perfectly just manner."

The Scranton Surface Protective Association has sent out a call to all members of the House and Senators in the nine anthracite counties to attend a conference in this city on Jan. 22. This is the day when both branches of the assembly will reconvene after the recess, during which the organization of the committees will be decided upon.

Does Third Estate Exist?

The Penman vs. Jones case is the most important mine-cave case that has come before the Supreme Court. This was argued on Jan. 5 and the outcome will decide whether there is a "third estate" under the laws of Pennsylvania. While the present action is trivial so far as the amount of money is concerned, the court's findings will govern all such actions in the future. The lower court has decided that surface support is a property right, and accordingly upheld T. F. Penman in his suit against John M. Jones, which was brought to enforce a contract for the sale of a lot in which surface support was guaranteed.

Two questions were put to the Supreme Court, as follows:

"Where the owner of both surface and the underlying mineral estate conveys the surface, reserving in apt terms the right to disturb the surface support, and subsequently conveys to another grantee the mineral estate and also all the estate, right title and interest, benefit, etc., in and to said mineral estate, whether the reserved right of disturbing said surface lands passes under the second conveyance or remains in the common grantor, and is capable of being thereafter conveyed to the grantee of surface lands, so far as to vest in him the right of surface support.

"Whether the clause in the conveyance of the mineral estate granting all rights, interest, etc., in and to said mineral estate does not convey said reserved rights of disturbing the surface lands."

An early decision is expected.

PENNSYLVANIA

Anthracite

Hazleton—Mine operators, mine inspectors, representatives of the miners' union and all others interested in the first-aid and safety movements about the collieries have been invited to attend a meeting to be held in this city on Jan. 12. The meeting is for the purpose of organizing and regulating a system of first-aid and safety meets. H. M. Wilson, a former official of the Federal Bureau of Mines, will be the main speaker. The new organization will arrange for a series of first-aid and safety contests to be held annually by the larger mining companies, that they, together with smaller corporations, may send their representatives to district and county seats, the winners of the latter to attend a state meet. This may be followed by a triennial international meet. This meeting is one of several to be held throughout the state by the Associated Companies.

Cranberry Junction—The output of the Cranberry colliery of the Lehigh Coal and Navigation Co., where an expenditure of $300,000 is under way for the electrification of the entire plant, will soon be materially increased with completion of the new stripping at that place. Shortage of labor has hampered work to a considerable extent.

Ashley—Two men were killed and four others so badly burned that two of them will probably die when a gas explosion occurred in the Maxwell No. 20 colliery of the Lehigh & Wilkes-Barre Coal Co., on Jan. 6. The explosion took place on the No. 7 plane. It is believed that a naked lamp exploded a pocket of gas after the gas had been released by a fall of a part of the roof. The dead miners had been notified by the section foreman of the poor circulation of air in their chambers and warned to be careful. While admitting that the cause and nature of the explosion is conjectural, company officials assert that the explosion was due to powder. The miners, however, assert that it was a gas explosion.

Coaldale—A large gray fox was captured recently by mine workers in the Foster tunnel of the Lehigh Coal and Navigation Co. The animal had been seen several times, but the miners thought it was a dog.

Bituminous

Waynesburg—Announcement was made recently of the sale of 860 acres of Greene County coal to James A. Campbell, president of the Youngstown Sheet and Tube Co. and a member of the J. V. Thompson Creditors' Committtee, for $442,900. The sale was made through the efforts of J. V. Thompson, the options, however, having been taken by Rev. G. G. Kerr for the Buckeye Coal Co. The price paid was $515 an acre. The sale of this coal disposes of the last of the Cumberland Township holdings by the original owners. There are perhaps a few small tracts of little consequence that remain in the hands of the framers, but practically all of the coal underlying the township has now been sold to concerns which will probably operate it..

Garrett—A number of new operations are being opened up by mining companies along a branch of the Baltimore & Ohio R.R. Gogle Bros are opening 175 acres, Fritz Bros. 260 acres and Romesburg Bros. 300 acres. J. Blair Kennerly is

opening 240 acres on the White's Creek branch of the Baltimore & Ohio near the Anspach mines. Hitchman Bros., of Mt. Pleasant, are opening up an extensive operation consisting of 100 acres just below Markleton on the main line of the Baltimore & Ohio.

Holsopple—A dozen new dwelling houses for the Pretoria Coal Mining Co. are about completed and will be occupied before long by men who work in the company's mines. A dozen additional houses will be erected in the early part of the spring.

Portage—The Miller Shaft Coal Co. is installing electric equipment at its plant and the officials say the improvement will more than double the tonnage of the operations. It is intimated that at least one more opening will be made at Portage next summer.

Johnstown—The Boucher-Cortwright Co. recently applied for a charter and purchased a considerable tract of coal land near Beaverdale. It is said that one of the largest and most modern plants of this section of the state will be located there.

Altoona—The Penn Central Light, Heat and Power Co. which supplies many mines, factories, and other consumers of electric power throughout this neighborhood, has purchased the mineral-right in 40 acres of coal land near Gallitzin, part of the estate of F. X. Bradley, and will open a mine near the Pennsylvania R.R.

Marianna—The Midvale Steel and Ordnance Co. recently purchased the Pittsburgh-Westmoreland Coal Co. for $9,000,000. The property comprises approximately 16,000 acres of gas coal and coking-coal land. The property adjoins that of the Marianna Coal Co., which Midvale Steel bought some time ago. The Pittsburgh-Westmoreland Coal Co. went into the hands of receivers in 1914. At that time the property was appraised at somewhat over $13,000,000.

Pittsburgh—Meetings of men interested in first-aid and mine-rescue work are being arranged at Scranton for Jan. 12; Johnstown, Jan. 13; and Pittsburgh Jan. 15, under the auspices of the United States Bureau of Mines, the Pennsylvania State Mining Department and the director of the Associated Companies for the purpose of discussing first-aid and rescue work, making arrangements for contests to be held throughout the state to select teams to take part in an international contest in September, and for discussing the possibility of securing legislation, looking toward the establishment of state rescue and first-aid-stations at different mining centers throughout the commonwealth.

WEST VIRGINIA

Bluefield—Railroad officials recently announced that the coal shipments from the southern West Virginia field are rapidly increasing, and it is expected that normal conditions will be reached within a short time. Miners are rapidly returning to the field, and going promptly to work.

Several thousand acres in Raleigh County were recently sold to A. D. Preston, of Beckley, and C. L. Miller, of Hinton. This tract was purchased by the late W. F. Taylor, of Philadelphia, in 1873. A considerable amount was spent in draining the bottom land along New River, building steam mills, barns, houses, churches, etc., all of which were burned a few years afterward. The new owner proposes to build a large water-power plant on the property to furnish power to the coal fields of Raleigh County.

Fairmont—The Hutchinson Coal Co. recently completed arrangements for opening another mine when it purchased the old Robey tipple on the Short Line R.R. The Robey mine has been worked out, but adjoins a considerable piece of coal owned by the Hutchinson interests. This coal will be brought out through the Robey opening. Approximately 350 tons will be mined at the start. This, however, will be increased to 500 tons, as the old opening is cleaned up.

Charleston—The Island Creek Coal Co. will in future conduct the sales of the coal produced by it, and also the product of the Pond Creek Coal Co. Formerly these sales were conducted by the Island Creek Coal Sales Co. The change in selling was made to do away with an unnecessary subsidiary company and to simplify accounting.

ALABAMA

Dolomite—Two hundred beehive coke ovens belonging to the Woodward Iron Co. at Dolomite, which have been idle for several years, will be reclaimed and placed in operation the first of next month. The tonnage of the company's by-product coke ovens in 1915 was 586,879.

Birmingham—The Board of Examiners will hold a session from Jan. 22 to 25, inclusive, to pass upon the qualifications of applicants for positions as first- and second-class mine foremen and fire bosses in the coal mines of Alabama. As there is great activity in coal-mining operations at this time it is expected that a large class will take the examination for these positions.

KENTUCKY

Earlington—Fire recently destroyed the tipple at the Heckla mine of the St. Bernard Mining Co., with a loss of several thousand dollars. The tipple was an old one and has been replaced by a temporary structure which is serving to keep the mine operating.

Louisville—All eastern and southwestern Kentucky is threatened with damaging floods. Heavy rains have caused streams to rise with suddenness, in some cases carrying bridges away and causing washouts on the railroads.

Hazard—The Hazard Coal Operators' Association, organized here during 1916, will largely increase its membership during the current year, making it one of the largest associations of its kind in eastern Kentucky.

Whitesburg—Operators in the Elkhorn and Boone's Fork territory of this (Letcher) county report that heavy rains and high freshets have greatly hampered activities during the recent past. Three unusually large freshets have passed down the streams. Many of the miners' houses in the towns were flooded, according to reports, while mines in some cases were overflowed with water.

OHIO

Pomeroy—The Pomeroy Colliery Co. has leased the old Edward mine at Pamunkey. This operation is now being pumped out. The new firm expects to build a large tipple and run a switch from the local electric railway. The work of cleaning up is being pushed as fast as possible so that operations can be begun at an early date.

Fultonham—The Kehoto Coal Co., organized some time ago to develop a large stripping operation near Fultonham, has started operations with a capacity of 2000 tons daily. The plant cost in the neighborhood of $200,000.

Columbus—Coal operators in Ohio mining districts are much interested over the announcement coming from central Pennsylvania to the effect that the operators have granted a flat increase of 10 per cent. to all miners and mine employees included in five subdistricts in that state. What effect this action will have upon the miners in Ohio is being freely discussed. Some time ago miners of the Hocking Valley district met at Glouster to ask for an increase in the wage scale covering that district, but no action resulted.

Complaint has been filed before the Ohio Public Utilities Commission by a number of coal operators in the Hocking Valley to the effect that they will have to close their mines unless a better car supply is rendered available. It is stated in the complaint that only about 20 per cent. of the cars required are furnished. It is understood that the complaint will be handed to the Interstate Commerce Commission, which is already considering the shortage of cars.

INDIANA

Bicknell—The American Coal Mining Co., of Knox County, Indiana, has recently become a heavy producer. Its hoisting equipment is one of the largest capacity in the West. On Dec. 2 last a total of 4116 tons was hoisted from the shaft at this mine, and the average for six consecutive days was 4000 tons. This is the record production from any mine in the State of Indiana in any one day, and the owners freely predict that 5000 tons will be hoisted in one day before the present year is over.

Bruceville—The fire in the Bruceville mine of the Oliphant-Johnson company has attracted considerable attention throughout southern Indiana. Both the main and air shafts have been sealed since Dec. 29, with the exception of a short period after the third explosion on Christmas Day. The seals were blown off by the force of this explosion and a short time elapsed before they could be replaced. During this interval a small quantity of air entered the mine and it is not unlikely more light explosions will take place as a result. Immediately after the first explosion the Bureau of Mines experts rushed to the scene and have been constantly on the ground. Daily samples of the gases are being taken and the experts are able to judge from the analyses the approximate conditions existing below. Work was commenced Jan. 4 drilling a hole from the surface into the room where the fire occurred. The room will then be flooded with water. The hole will also serve to permit gas samples being taken in closer proximity to the fire, which will allow of judging more accurately when the fire has been extinguished. The company officials and Bureau of Mines representatives both feel that the fire has now been extinguished. When they are absolutely certain that the mine can be entered without danger, the seals will be removed, the mine opened and the necessary repairs made. The officials of the company stated on Jan. 4 that they were hopeful of being able to start operation about the middle of January, but there is no way of telling definitely at the present time. Messrs. Smith and Powell, of the Bureau of Mines, are watching the situation carefully and will take charge of the work until they are certain the fire is extinguished

ILLINOIS

Gillespie—The Superior Coal Co. of this place now claims the state record on the amount of coal hoisted in a day. The company's mine No. 3 held the record for some time. A few weeks ago the Livingston mine took it away. Now mine No. 3 has regained its laurels by hoisting 5502 tons in 1556 mine cars in one day. There were 392 loaders and 24 machine runners engaged. The day's output was hauled away in 205 freight cars, made up into three trains. The mine's former record was 5195 tons. The Livingston mine record was 5285 tons.

Taylorville—A spectacular fire destroyed the top works of the Old Mine recently. The flames burst almost simultaneously from all parts of the huge building and illuminated the country for miles around. The fire department could do nothing except save the engine house. Two coal cars on the siding were burned. Operation of the mine had been suspended for about a year on account of a fall which rendered about $75,000 worth of repairing necessary. The mine is owned by the Springfield District Coal Co. The insurance is said to be between $10,000 and $15,000. The origin of the fire is not known.

Belleville—Miners of Belleville and vicinity are arranging for a mass meeting at which plans for the organization of a coöperative medical association will be broached. Frank Farrington, president of the United Mine Workers of Illinois; Dr. Greenbaum, chief surgeon of the Miners' Medical Society of West Frankfort, Ill., and Dr. W. H. Evans of Murphysboro, Ill., will be the speakers.

Marion—Williamson County almost made a record in its coal production for December. The Chicago & Carterville Coal Co. lead the producers with about 60,000 tons for the month. The total tonnage for the month was in the neighborhood of 550,000 tons and was shipped over four roads. These in the order of tonnage handled were as follows: C. B. & Q., Missouri Pacific, Illinois Central and the C. & E. I.

Dunston and Williford have opened the Pittsburgh mine near here, and the Wallace mine near Pittsburgh has also recently been placed in operation. This leaves only one mine in Williamson County—the Keystone at Pittsburgh—idle. It was recently sold under the hammer to George J. O'Brien, of Pittston, Penn., for $24,500.

Greenfield—Coal is being hoisted from the new mine recently opened here. The bed being worked is regarded as one of the best in the vicinity. Modern machinery has been installed and more has been ordered. It is expected that the force will be doubled in two months.

West Frankfort—The Executive Board of the United Mine Workers of Illinois is considering a project for the establishment of a hospital here. It is proposed that the organization appropriate $10,000 for the purpose.

Girard—The owners of the Greenridge coal mine near here have decided to resume operations. No coal has been taken out of the mine for four years.

Duquoin—The Illinois State Miners' Examining Board will hold a session here Jan. 12, at Belleville on the 17th, at Staunton on the 18th, at Taylorville on the 23rd and at Springfield on the 24th.

Personals

J. P. Reese was recently elected vice-president and general manager of the Consolidation Coal Co. with headquarters at Gillespie, Ill.

Fred R. Bell, formerly mining engineer for the Sloss Sheffield Steel and Iron Co. at the Flat Top and Bessie mines, was recently made superintendent at the latter operation.

A. H. Gardner, formerly with the Straight Creek Coal and Coke Co. and previously with other coal concerns, has become assistant general manager of the Harlan Coal Co., Louisville, Ky.

D. C. Thomas has been made vice-president of the Piney-Fork Coal Co., which has a large stripping operation in Jefferson County, Ohio. This promotion fills the vacancy caused by the death of J. F. Johnson, of Bellaire.

R. C. Bargo, who has been superintendent of the Moss Coal Co., at Meldrum, Ky., became associated Jan. 1 with the Ohio & Kentucky Coal Co., of Cincinnati and will have charge of the Middlesboro offices of the company.

Thomas Beynon, superintendent of the Tunnel mine for the past year, has been promoted to the same position over the Galord mine near Martins Ferry, Ohio. J. L. Muller, of West Virginia, will succeed Mr. Beynon at the Tunnel mine.

Colonel L. E. Tierney, coal operator of Powhatan, W. Va., it is expected will be made Democratic national committeeman for the state when the state committee meets to fill the vacancy caused by the resignation of Senator Clarence W. Watson.

James H. Cassidy, ex-congressman who two years ago fled Cleveland, Ohio, following the discovery that the books of the C. & P. Coal Co., of which he had been appointed receiver, were

short $19,000, recently returned. Mr. Cassidy is paying his debts and says he expects to have the slate clear in six months.

Adrian M. Rea and **Oscar W. Black** recently purchased the mines of the Fern Hill Coal Co. at Owensboro, Ky., and have begun operation. These mines will be equipped with the latest electrical appliances. They as well as those in Laurel County, Ky., held by the same owners, will be operated under the trade name of the Appalachian Coal Co.

J. W. Powell, formerly superintendent of the Cottonwood Coal Co., at Lehigh, Mont., and who has spent 15 years in the Northwest as mine manager and superintendent, recently accepted a position with the Consolidation Coal Co. at Jenkins, Ky., as superintendent of two of its large producing mines; these are Nos. 204 and 205, located in the Elkhorn division.

Edwin C. Curtis of Nanticoke, Penn., was reappointed on Jan. 2, as mine inspector of subdistrict No. 9 to fill the vacancy caused by the resignation of Samuel J. Jennings. Mr. Jennings resigned before the last election but was reëlected for a full term of four years. Mr. Curtis was appointed several weeks ago to fill the unexpired term, and has now been reappointed for the full term. The district covers the west side of the Susquehanna river from Pittston to Kingston. Mr. Curtis will have headquarters at Pittston.

James E. Strong, at present general superintendent of coal mines of the Gulf States Steel Co., has accepted a position in the same capacity with the Sloss-Sheffield Steel and Iron Co., effective Feb. 1, 1917. He succeeds Jones G. Moore, who died recently. Mr. Strong started his career in mining operations at the age of 20 years in 1884, and later attended Lehigh University, where he completed his course in mine enginering in 1888 and returned to this district, where he has been actively engaged in mining operations since with the exception of four years when he had charge of the operations of the Montana Coal and Coke Co. at Electric, Montana. Mr. Strong is a native of Great Britain, and has studied mining operations in the principal European countries and in South Africa. He is eminently fitted for the duties of the position to which he has been appointed.

Obituary

Jones G. Moore, general superintendent of coal mines of the Sloss-Sheffield Steel and Iron Co. for the past ten years, was found dead in bed recently at his residence in Birmingham, Ala., having succumbed to an attack of acute indigestion. Mr. Moore was a pioneer in the coal mining district of Alabama, having been connected with mining operations in various capacities since 1880, and was one of the best known and most respected citizens of Birmingham. He was actively interested in all civic affairs of the city and state, and had for many years been a direcotr of the American Trust and Savings Bank, one of the city's strongest institutions, and at the time of his death was First Vice-President of the Alabama Safety Association, and always took a deep interest in the work of the association. He is survived by three daughters and one son. He was 58 years of age.

Industrial News

New York, N. Y.—C. M. Weld, mining engineer, recently removed his office to 2 Rector St., New York City.

Birmingham, Ala.—The Alabama Safety Association will hold its annual meeting for the election of officers on Saturday, Jan. 13, 1917.

Birmingham, Ala.—The Bryan Coal Corporation has let contracts for the electrification of its mine and plant at Red Star, Walker County. About $30,000 will be expended, the work to be completed as early as practicable.

Chicago, Ill.—The National Pneumatic Co., of 515 Laflin St., Chicago, recently took over and absorbed the factory of the Burdett Rowntree Manufacturing Co., in Chicago. This absorption will tend toward better service.

Piedmont, W. Va.—The Piedmont Coal Corp., recently incorporated for $50,000, is equipping a new mine at this place. This firm has a lease on 535 acres of Kittanning and Lower Kittanning coal. Shipments will be begun about Jan. 15.

Cleveland, Ohio—The Short Creek Coal Co., recently awarded a contract to the Roberts & Schaefer Co. for a double Marcus patent coal tipple, equipped with "Rands" shaker loading booms, for installation at its mine at Adena, Ohio.

Scranton, Penn.—James S. McNulty, president of the Scranton Life Insurance Co., heads the recently formed East Point Coal Co., which is making application for a charter. The company owns about 300 acres of good coal land between White Haven and Freeland.

Cambria, Penn.—Deeds have just been recorded transferring from the Jonathan Jones heirs 356 acres of coal land to T. Stanton Davis and J. Edgar Long. The purchase price is $29,428. The land adjoins a tract already purchased by the Davis-Long interests, making a total holding of 2500 acres.

Birmingham, Ala.—One hundred and fourteen men lost their lives in the coal mines of Alabama in 1916. Within the last few weeks 48 men lost their lives in mine explosions at Marvel and Bessie mines. In 1915 there were only 72 lives lost. The largest loss of life was in 1910 when 283 men were killed.

Waynesburg, Penn.—A deed was recently recorded for the transfer of the Rices Landing Coal and Coke Co.'s plant, at Rices Landing, to the H. C. Frick Coke Co. The transfer includes 437 acres of the Pittsburgh or River bed of coal, 134 acres of surface, 5 lots in Rices Landing, and the tipple and other head works.

Bower, W. Va.—The Davis Colliery Co. has placed a contract with the Roberts & Schaefer Co. for a double Marcus patent picking table screen for installation in the existing steel tipple at Bower, W. Va. The construction of the large concrete and steel Marcus coal tipple for this company at the Sivad mine will be started shortly.

Harrisburgh, Penn.—The public service commission was asked on Jan. 5, by Vernon F. Taylor, president of the Indian Creek Colliery Co., to compel the Indian Creek Valley R.R. to get all three of its engines out of the repair shop and onto the line so he and other operators can get their coal to market. He is willing to charter an engine by the day he tells the commission.

New York, N. Y.—A scientific study of heating plants in 267 buildings occupied by the Fire Department of New York City has resulted in a saving of 2000 tons of coal a year, according to a report on coal consumption in the last three years submitted to Fire Commissioner Adamson. The department is now being served with coal at the fire houses at an average of $6.80 per ton according to the report.

Buffalo, N. Y.—Announcement is made of the incorporation of the Corson Byproduct Coal Corporation with $300,000 capital stock. The incorporators are George A. Corson, Albert A. Engle and Eugene C. Roberts, all of Buffalo, N. Y. The company has coal property at Elkhorn, in Central Kentucky, and will open mines there as soon as satisfactory shipping arrangements can be made with the Chesapeake & Ohio R.R.

Whitesburg, Ky.—The White Oak Coal Corporation is being organized at Wise, Va., by R. P. Bruce who will be president, W. H. Bond, secretary, and others, with a capital of $25,000. It is the purpose of the new company to start a development in the Guests' River section immediately beyond the Kentucky border line on the proposed branch of the Interstate R.R. now under contemplation. Other coal companies, including the Virginia Iron Coal and Coke Co. will make developments along the route of the new road.

Birmingham, Ala.—The Tennessee Coal, Iron and Railroad Co. will erect several hundred three- and four-room dwellings for employees at Bayview, Edgewater and Docena coal mines. It is understood that contracts have already been let for the construction of these houses. The strong demand for coal, both for company consumption and for market, necessitates an increased production at these mines, and provisions had to be made for housing additional labor.

Birmingham, Ala.—A single coal corporation controlling an output of 5,000,000 tons of coal annually in the Warrior River field is reported as being a possibility. To create such an organization it will be necessary for about 15 independent coal companies to merge. Property valuations of the mining developments of these concerns have been in progress for some three months. Negotiations for the merger have not yet been begun, and the formation of such a syndicate will depend largely upon the satisfaction of the individual companies with the property valuation.

Benton, Ill.—One of the largest coal deals ever consummated in Franklin County, Illinois, was the sale of the Middle Fork mine to the Bunsen Coal Co., a corporation which was recently changed to the name of United States Fuel Co. The sale was made last December, and the property was formally taken over by the purchaser immediately. At a meeting of the stockholders of the middle Fork Mining Co. on Dec. 28 the sale was ratified. The purchase of this property makes the holdings of the purchaser in Franklin County 20,000 acres. The new company has signified its intention of spending several million dollars in the improvement of its holdings.

Taylor, Penn.—Failure of the Delaware, Lackawanna & Western Railroad Co., to provide electric batteries for setting off powder charges in the Sloan mines will play a prominent part in the suit of John Mulherin against the company for $25,000 damages. Mulherin was employed as a miner by the company in January, 1915. While he was about to set off a charge of powder, gas in his chamber became ignited. He claims that the fireboss attempted to extinguish the flames and in so doing fanned the blaze into the hole containing the powder, causing the explosion. Mulherin says he was seriously injured by the blast and as a result lost the sight of one eye. He has been unable to work since he alleges.

Laredo, Tex.—It is reported that through the representations of Congressman Slayden, the U. S. Geological Survey will make a report of the coal resources of the territory between Sam Fordyce and Eagle Pass, Texas. This territory is situated in the basin of the Rio Grande river in which coal is being mined in restricted areas near Laredo and Eagle Pass. The formation of the coal in this basin as indicated by the small districts already developed, shows the Rio Grande to be an anti-clinal axis; the coal dipping about 2 per cent., with its extent inland undefined as the mines opened are located within two or three miles of the river.

The field operated near Laredo contains two workable beds known as the Santo Tomas and the San Pedro about 36 and 30 in. thick respectively. An average analysis is as follows: Moisture, 2.96 per cent.; volatile matter, 47.42; fixed carbon, 35.69; ash, 13.93 per cent. The sulphur content is 2.32 and the thermal content, 11,863 B.t.u.

Norfolk, Va.—The largest and most powerful locomotive in the world has just been constructed for the Virginian Ry. by the Baldwin Locomotive Works at Eddystone, Penn., and was delivered at Sewalls Point several days ago. It has a tractive power rating of 166,300 lb., will pull 2580 tons over a 2.07 per cent. grade, and is capable of hauling 300 loaded cars if it were practicable or possible to keep that many coupled together. This engine, which will be known as number 700, leaves shortly for its ultimate destination at Clark's Gap Hill, near Elmore, W. Va. It was secured by the Virginian Ry. solely for hauling coal cars over the grades in the mountains at that point. Number 700 is a triplicate articulative engine with three sets of driving wheels. There are only three other locomotives of this type in existence, all being owned by the Erie R.R. It cost upwards of $80,000 but could not be duplicated at anywhere near that figure at the present time.

St. Louis, Mo.—Contiguity to the Belleville and Carterville coal districts will be urged upon the United States Naval Board by an organization representing the five cities of the East Side industrial zone as one of the principal reasons why the proposed Government armor plant should be located in Illinois adjacent to St. Louis. The organization was formed at a meeting held recently in East St. Louis. Maurice V. Joyce of East St. Louis was elected chairman and E. M. Sorrells, secretary. An executive committee composed of representatives of the various commercial bodies is to prepare data and lay it before the Naval Board. The cities represented are East St. Louis, Belleville, Alton, Granite City and Collinsville.

Belleville,, Ill.—Two suits, each for $10,000, were filed in the St. Clair County Circuit Court recently against the Illinois Central R.R. for failure to supply sufficient cars to transport the output of the mines. The plaintiffs are the Groom Coal Co. of Belleville and J. A. Hamilton, trustee for the Johnson Coal Co. of Marissa. The Groom company, operating the Richland mine at Belleville, alleges that between Jan. 1 and Mar. 31, 1913, it ordered cars for an output of 63,090 tons and received cars for only 28,145 tons. Hamilton alleges that between Jan. 1 and Apr. 21, 1912, he ordered cars for 37,800 tons and received only enough for 10,700 tons and between Sept. 1, 1912 and Apr. 1, 1913, he ordered cars for 88,200 tons and received only enough for 27,500 tons.

Pittston, Penn.—Announcement has been made that the Delaware & Hudson Coal Co. has carried into effect a plan for the elimination of the contractor in the mining of anthracite coal. During the negotiations in 1916 for a new working agreement, the union representatives made a vigorous effort to do away with the contract plan—by which the company contracted with certain persons for the mining of definite sections of an operation and the contractor sublet the work to the individual miners. It is understood that the D. & H. officials gave assurance at that time of their desire to eliminate the contract miner and have since been developing the plan which has just become effective. Under the new system the miners will be employed directly by the company and no man will have more than one chamber. Cadwallader Evans, Jr., general superintendent, had charge of the developing of the new system, which now affects all but a few places where contracts still have a period to run. Contract mining is extensive in the Upper Anthracite field and the D. & H. followed the system largely. The abolition of the contract miner was not made a part of the 1916 working agreement and the company has been working out its new system of its own accord.

St. Louis, Mo.—The Board of Public Service has approved the draft of a bill, to be introduced in the Board of Aldermen, which is intended to prevent any arbitrary or exceptional charges on coal and other commodities brought across the Municipal Free Bridge, which is nearing completion. The bill defines a traffic zone embracing the cities of St. Louis and East St. Louis and requires that rates shall be the same for carrying freight and passengers to any part of this zone.

Market Department

GENERAL REVIEW

Retail anthracite trade easier but the wholesale situation as stiff as ever. Very sharp decline in bituminous quotations. Preliminary discussions on new contracts. Improved car supply and heavy shipments in the Middle West.

Anthracite—The moderate weather has relieved the pressure for coal at retail very notably, but without affecting the urgency of the demand on the mines. The current statement of anthracite shipments has definitely disposed of the theory that the reports of a shortage were largely for the purpose of enhancing values. It will be largely a weather market for the balance of the season, though there is little prospect of any important reaction, in any event. On the other hand, with the reserve stocks of the big companies practically exhausted, the advent of further severe weather, such as may be expected at any time, stimulating the consumption and interrupting movement, will precipitate a serious problem in supplies. Conditions at the loading docks at Tidewater are slightly easier, and a number of the individual embargoes have been lifted. A critical situation prevails in the Middle West. Supplies on the docks are generally exhausted, with the result that rail shipments are being diverted to that territory at the expense of other districts, which ordinarily rely on rail deliveries at this time. The hard coal situation at Chicago is regarded as the most serious in the history of the trade there.

Bituminous—The big feature of the week's developments was the announcement of a tentative base price of $4.75 at Hampton Roads on new business for the year beginning Apr. 1. This represents a flat advance of $1.75 per ton over the asking price of a year ago, but it remains for the agencies to demonstrate their ability to maintain this figure. In the meantime, the prompt market has eased up slightly in sympathy with the mild weather conditions, our table of 13 representative bituminous coals showing a decline of 42c. from last week, which was the maximum price of the winter to date. However, no marked recession can be expected before spring. In fact, the holiday suspensions have resulted in diminished receipts, and there is little improvement in the stocks at distributing centers. The railroad movement has become more irregular, so much so in fact that at New York, for instance, several transatlantic liners were obliged to delay sailing for as much as two days because of the non-arrival of coal.

Ohio Valley—An improved car supply and favorable weather caused a very persistent decline in the Pittsburgh district, amounting to a total of about $1.50, though the market later recovered 25 to 50c. from the lowest point. However, with colder weather a certainty and no let-up in the heavy steam consumption, there is little possibility of any important weakness developing. There is still considerable congestion at certain distributing centers, while numerous embargoes are continually interfering with shipments. There is some negotiating for vessel tonnage for Lake shipments next season, and it is already evident that iron ore shippers will be offering prices that will make it exceedingly difficult for the coal men to obtain tonnage. Preliminary discussions over new contract figures are heard though consumers are going slow, in the belief that the situation certainly cannot be more unfavorable to them in any event. There is little business expiring betwen now and Apr. 1, and there are possibilities of a reaction of more or less importance during the interval.

Middle Western—The recent higher temperatures have caused a very sharp reaction in the market, though prices continue substantially above normal particularly on steam coal, the demand for which continues unabated. An improvement in the railroad movement, due to the curtailed production over the holiday period, has also been a factor. Shipments increased, especially from mines working on railroad orders, a great many of which have been given a full car supply. One of the leading Middle Western independent companies has contracted for approximately 150,000 tons of production from smaller mines for delivery before Apr. 1. Labor shortages continue a factor, the miners having been very slow resuming work, following the holidays. The heavy progressive increase in demurrage charges has practically eliminated the accumulation of any reserves on track.

A Year Ago—Anthracite consumers pushed for tonnage. Improved car supply and milder weather cause a slight easing up in bituminous. Rumors of large tonnages negotiated for export. Reactionary tendency at interior points, though the Middle West continues firm.

Comparative Average Coal Prices

The following table gives the range of mine prices in car lots per gross ton (except where otherwise noted) on 12 representative bituminous coals over the past several weeks and the average price of the whole group for each week:

Boston	Last Year	Jan. 13	Jan. 6	Dec. 30	Dec. 23	Dec. 16
Clearfields	$2.75@3.25	$4.75@5.60	$4.75@5.60	$4.75@5.75	$4.75@5.75	$4.75@5.75
Cambrias and Somersets	3.00@3.40	5.00@6.00	5.00@6.00	5.25@6.25	5.25@6.25	5.25@6.25
Pocah. and New River[1]	2.80@2.90	6.75@7.25	7.00@7.50	7.25@8.00	7.00@7.50	7.00@7.50
Philadelphia						
Georges Creek	3.00@3.25	6.50@6.75	6.50@6.75	6.00@6.25	6.00@6.25	6.00@6.25
W. Va. Freeport	2.40@2.50	5.75@6.00	5.75@6.00	5.00@5.25	5.00@5.25	5.00@5.25
Fairmont Gas mine-run	2.00@2.10	5.50@5.75	5.75@6.00	5.25@5.50	5.25@5.50	5.25@5.50
Pittsburgh (steam coal)[2]						
Mine-run	1.25@1.50	4.00@4.25	5.00@5.25	4.25@4.50	4.25@4.50	4.00@4.25
¾-in	1.35@1.60	4.00@4.25	5.00@5.25	4.25@4.50	4.25@4.50	4.00@4.25
Slack	1.25@1.50	3.85@4.00	4.95@5.05	3.50@3.75	3.50@3.75	3.50@3.75
Chicago (Williamson and Franklin Co.)[2]						
Lump	1.60@1.75	3.75@4.00	4.00@4.50	3.75@4.50	3.75@4.25	3.00@3.50
Mine-run	1.20@1.35	3.50@3.75	4.00@4.25	3.75@4.00	3.50@3.75	3.00@3.25
Screenings	.90@1.00	3.50@3.75	4.00@4.25	3.75@4.00	3.50@3.75	3.00@3.25
Gross average[3]	$1.96@2.17	$4.74@5.11	$5.16@5.53	$4.73@5.19	$4.67@5.08	$4.48@4.90

[1] F.o.b. Norfolk and Newport News. [2] Per net ton. [3] The highest average price made last year was $4.80@5.33 made on Nov. 25.

BUSINESS OPINIONS

Iron Age—Little new steel capacity has been provided in England, though the Ministry of Munitions is making every effort to increase output. While more American machinery has been bought to increase Canadian munitions output, the need for steel from this side is practically the same. The failure of the Allies to exercise some options with munitions works in this country for the second half of this year does not change the steel works situation. The Steel Corporation's unfilled orders increased by 488,744 tons in December, bringing the total up to 11,547,286 tons, which was a new high record. The gain was considered satisfactory, although it does not compare with November, a month that brought an expansion of more than 1,000,000 tons.

American Wool and Cotton Reporter—The wool market has been quiet for the week but considerably stronger. Manufacturers are realizing more than ever the small amount of wool on hand, and there are indications of a lack of supply for operation before the new wool comes in. The mills are consuming wool very fast and buyers are making many inquiries as to prices and prospective amounts of material on hand. There is very little speculation at present.

Bradstreet—While post-holiday quiet continues to characterize trade conditions, the pause in this respect is much less marked than in former years, and, in fact, the momentum heretofore attained has been so great that current movements are remarkably quick. Inventorying in commercial channels occupies considerable attention, but this task is being hastened, and in industrial lines sustained activity in making up products is still the rule, though, of course, new buying is devoid of previous feverish aspects. Some salesmen are again on the road, and judging from the volume of spring orders received, the new year certainly has opened auspiciously.

Dun—Notwithstanding the holiday interruption, inventory-taking preparation of annual reports, and other impediments incidental to the inauguration of 1917, the past week has been far from dull. Consumption of necessities is sustained in noteworthy volume, on the whole, and the purchasing power in many directions is enhanced by the further wage increases that became effective on Jan. 1, the new year opening with aggregate payrolls at the highest point ever known. Commercial failures this week in the United States are 312, against 254 last week, 28[illegible] the preceding week and 481 the corresponding week last year.

Dry Goods Economist—Following upon an unusually good holiday trade retail merchants and buyers who are in the New York market this week express themselves optimistically as to the spring outlook. Manufacturers show no anxiety over the intention expressed by retailers to buy conservatively for their more distant requirements.

Marshall Field & Co.—Daily shipments of dry goods are in excess of the same week a year ago following the exceptionally heavy trade preceding the holidays. Many merchants are advancing the delivery date on ginghams and washgoods indicating an early consumer demand for this class of merchandise. Merchants are visiting the market in larger numbers.

Atlantic Seaboard

BOSTON

New prices announced, but no buying yet reported. Delivered prices for spot coal easier. Georges Creek and Pennsylvania grades just mulling along. Anthracite shipments subject to delay.

Bituminous—The week has developed the attitude of the Hampton Roads shippers toward new contracts, which even exceed expectations. Among producers the feeling is strong that approximately present conditions will prevail until June, and that export and bunker business will furnish all the demand necessary to keep prices strong. The basis therefore on new business, Apr. 1 to Apr. 1, has been announced by some of the factors as $4.75 f.o.b. Norfolk and Newport News for Pocahontas and New River. There will be much lifting of eye-brows at this, a full $1.75 up from last year's asking price, and it is unlikely there will be any rush on the part of the buyers. At the same time New England is restricted as to source of supply, and it may well be prudent for consumers to cover while the going is good.

Delivered prices have not been made as yet though developments in that direction were looked for the present week. In this territory such prices are contingent on rates of water transportation very largely, and it will be for the boat owners to decide what season rates should apply. Available bottoms are in relatively few hands and the question of whether freights shall be fixed at $2 or $2.50 is important. There will not be enough sail or barge tonnage open to Hampton Roads season charters to affect materially any rate that the steamship owners may decide upon.

New England buyers just now find the price differential so much in favor of deliveries all-rail that only those obliged to take supplies in heavy volume are arranging for water shipments. The difference in price alongside is also very marked between shipments of Pocahontas and New River and cargoes of Pennsylvania coal. In some cases it amounts to more than a dollar a ton. One curious phase is that several good-sized plants have been equipped with types of mechanical stokers that show particularly good results on coals originating in Pennsylvania, even those on which the ash content runs up to 10%.

Among the possibilities for 1917 is a larger market opening for some of the higher volatile grades from West Virginia via Hampton Roads. Unquestionably, any such range of price as now contemplated on the smokeless coals is going to force economies in many directions. Consumers will try every known way to get fuel at less cost and should it prove that the volume of Pocahontas and New River for New England is to grow less there will naturally be a lot of interest in other available coals.

There is virtually no change in the spot situation. The suspension over the holidays has only aggravated the slow movement and diminished the already light receipts at the piers.

As a result detention has increased, but so little coal has changed hands there is very little change in price. The weather is mild, and the demand is easier, if anything.

Among other troubles the Pennsylvania operators have numerous local strikes to contend with. The union officials apparently have no control over the men, and operators are at loss to know how to meet the conditions. It certainly makes them less disposed to name season prices.

There is still some speculative coal coming forward, both all-rail and by water. Prices are less firm, but $8 and over can still be had for prompt coal alongside Boston. No marked recession is expected while the winter season is on, unless a larger number of operators go out and canvass for 1917 business than is now expected.

Effective Jan. 8, Boston retailers advanced the price of bituminous from $7 to $8, per short ton delivered by team.

Bituminous at wholesale is quoted about as follows, f.o.b. loading ports at points designated, per gross ton:

	Clearfields	Camb. & Somerset
Philadelphia	$5.90@6.75	$6.25@7.25
New York	6.10@7.00	6.35@7.40
Baltimore	.....	.....
F.o.b. mines	4.75@5.60	5.00@6.00
Alongside Boston (water coal)	8.00@8.50	8.25@8.75

Pocahontas and New River are quoted at $6.75@7.25 f.o.b. Norfolk and Newport News, Va., for spot coal, and $8.75@9.50 on cars Boston and Providence for inland delivery.

Anthracite—Only the mild weather is enabling retailers to keep running. Deliveries in Boston are still on a minimum basis, usually 1-ton lots, and this practice is general through New England. Loading continues very slow and cold weather has added to troubles at the piers. Ten days to a fortnight is now the usual dispatch. Car-supply is still irregular and the outlook is discouraging.

The re-opening of the Cape Cod Canal has made Boston more accessible to the box-type of barge so much used on Long Island Sound and correspondingly more "independent" coal is being offered. The retailers are still absorbing it about as fast as offered, and any surplus finds a ready sale on cars for distribution inland.

PHILADELPHIA

Anthracite retail demand quiet and wholesale strong. Storage yards almost depleted. Premium sales increase. Steam coals tighten. Bituminous prices ease off slightly. Some contract activity.

Anthracite—The demand on the retail dealers continues moderate, as has been the case for more than two weeks past. The entire retail trade is expressing the hope that there will be no return of severe weather and from all indications this is the only thing that can possibly save the situation. Even though the retail business is slowing up, the dealers continue to urge the shippers for more coal. The collieries have about reached their normal production again after the slump over the holidays and fair shipments are now being made.

The big shipping company that did so much to relieve the tense market the first few days of the year, reports that by the middle of the month its surplus will be entirely exhausted. This company by paying labor double wages succeeded in working its storage plants on Sunday, Dec. 31, and on New Year's Day which brought five hundred cars of chestnut and pea to the Philadelphia market.

The Government reports for last year showing that the anthracite production had fallen off has done away with the suspicion that the present shortage was a fictitious situation created for the benefit of the mining companies. Indications are that the production for the current year will be even shorter. One of the smaller companies reports that its output has been running 40% short since Oct. 1, while the larger operators are known to be anywheres from 20 to 30% under normal.

One of the largest companies has just put in operation a large new washery plant which is producing at the rate of 1000 tons per day and within the next two weeks it will start two similar plants of about the same capacity; also by the time spring arrives it expects to have at least three more large plants producing coal.

Many local dealers whose yards are practically empty have had coal on the road since before Christmas. It is small wonder that cars are scarce if they are in transit two weeks on the short haul between the mines and this market.

Many cases of Philadelphia dealers paying premiums have been reported and this will probably become still more general if the weather turns cold. It is this period the dealers have been dreading, as so many of the large early buyers return about this time for a second supply. This market, as usual, has been reluctant to pay premiums, but quite large sales have been made at fifty cents and in some cases a dollar above circular since the collieries shut down for the Christmas holidays. The new retail prices announced two weeks ago have not been adopted by all the dealers, though a number of the chronic price cutters have taken advantage of the situation to increase their figures by ten cents a ton. Those dealers who have purchased the high price coal remark on the promptness with which it is delivered; we know of some deliveries that were made the day after the order was taken.

So many stove coal users have been persuaded to use egg that the latter is now in particularly short supply and this may make a better market here in the future for this size.

The demand for chestnut continues and many dealers are in short supply, but the recent shipments have been heavier than on egg and stove. Pea coal seems to stand the strain better than any of the domestic coals and dealers along the Philadelphia & Reading are particularly fortunate though this has been due almost entirely to shipments from storage stocks that are now nearly empty.

The steam coals show signs of becoming even stronger than they have been. A particularly heavy demand set in this week from New York and New England points for both Nos. 1 and 2 buckwheats and it is reported that sales of the former size have been made at $4.50 at the mines, with a corresponding increase in the other sizes. If there is one size that is easier than the others it is probably barley, but even on this size we have heard of some contracts being closed at $1, which is a considerable advance over last year, and we know that even as much as $1.25 has been quoted for contracts on the same size.

Prices per gross ton f.o.b. cars at mines for line shipment and f.o.b. Port Richmond for tide are as follows:

	Line	Tide		Line	Tide
Broken	$3.60	$4.75	Buck	$2.00	$2.90
Egg	4.15	5.25	Rice	1.25	2.15
Stove	4.10	5.60	Boiler	1.10	2.00
Nut	4.50	5.55	Barley	1.00	1.90
Pea	2.80	3.70			

Bituminous—The market became somewhat unsettled toward the close of last week and prices showed a downward tendency; especially was this true of the gas coals, as the steel mills have curtailed their buying for a short period. It is known that they bought very heavily last month in anticipation of the usual holiday idleness and this coal is now beginning to arrive. The price changes were not very significant, probably not amounting to more than 25c. at the most on any grade. As it now stands most sales seem to be made at from $6 to $6.50.

Despite the slight easing off it is believed that higher prices are due in a few weeks at the most. The mild weather is quite unusual at this time and with the return of more seasonable conditions the upward movement will once more be under way. Even now no one has any surplus coal to offer and any quotations made on spot coal are still on the basis prevailing for the past several months, and are made only for immediate acceptance.

The labor supply continues below normal but is sufficient for the entirely inadequate car supply, which this week has been running from 15 to 20%. In addition the movement of cars is especially slow, shipments taking from one to six weeks to reach destination, and the railroad authorities offer no hopes for relief in the near future.

There is understood to be some contracting going on quietly, and there are rumors that some of the largest industrial plants are making overtures for closing long-term contracts covering a period of from three to five years. However, it is unlikely that any very large tonnages have been protected as yet, and the stir in this direction is actually due to the anxiety on the part of the consumer to close rather than any particular desire on the side of the producer. It is certain that no considerable tonnage will be closed until around Apr. 1, and there is much speculation as to what conditions will be at that time.

The prices per gross ton f.o.b. cars at mines are about as follows:

Georges Creek Big Vein	$6.50@6.75
South Fork Miller Vein	6.50@6.75
Clearfield (ordinary)	6.00@6.25
Somerset (ordinary)	6.00@6.25
West Va. Freeport	5.75@6.00
Fairmont gas, lump	5.75@6.00
Fairmont gas, mine-run	5.50@5.75
Fairmont gas, slack	5.00@5.25
Fairmont lump, ordinary	5.50@5.75
Fairmont mine-run	5.25@5.50
Fairmont slack	5.00@5.25

NEW YORK

Anthracite market in good condition with prices lower. Loading improves. Demand for small grades heavy and supplies low. Transatlantic liners held up by shortage of bituminous. Contract making under way.

Anthracite—The anthracite market is in good condition. There has been a softening in quotations for the prepared coals, but that has not tended to increasing sales. The mines have been running light owing to car shortage, lack of labor and holidays. The first of the week the wholesale dealers could have booked many orders if they could have guaranteed deliveries within a certain time. The situation at the loading docks shows improvement. Many individual embargoes have been lifted and some of the docks are practically free.

There is a continued shortage of broken, egg, stove and chestnut. Broken is not to be had so far as this market is concerned, scarcely enough being received here to fill contracts. Pea coal is scarce and hard to get.

The small sizes continue in heavy demand. Buckwheat No. 1 is practically out of the market. Those operators who have found it difficult at times to dispose of their boiler coal are now finding a ready market at good prices.

For supplying several departments of New York City with various tonnages of anthracite coal, offers received on Jan. 4 showed prices of $9.98 per ton for egg, stove, chestnut and broken and $8.85 per ton for pea coal for the Borough of Manhattan and from $9.80 to $10.80 for the domestic sizes and $8.30 to $9.48 for pea coal in Brooklyn. For deliveries in the Bronx the prices ranged from $9.87 to $10.47 for the domestic coals and $8.74 to $8.99 for pea coal. No bids were received for supplying the demands in Queens and Richmond or on 300 tons of buckwheat No. 1 for Brooklyn.

Current quotations, per gross ton, f.o.b. Tidewater, at the lower ports are as follows:

	Circular	Individual
Broken	$4.95	.....
Egg	5.45	$7.50@8.00
Stove	5.70	7.50@8.00
Nut	5.75	7.50@8.00
Pea	4.00	6.75@7.00
Buck	2.75	6.25@6.50
Rice	2.20	4.75@5.25
Barley	1.95	3.25@3.50
Boiler	2.20	.....

Quotations at the upper ports are generally 5c. higher on account of the difference in water freight rates.

Bituminous—Quotations have dropped off about $1 from what was practically the high-water mark, and demand is easy. There is considerable trouble with shipments and loaded boats continue in good demand with prices stiffer than for coal at the docks. Early this week the sailings of several transatlantic liners were postponed from 12 to 48 hr. owing to the nonarrival of loaded barges. Much of the delay was attributed to bad car supply and frozen coal which made unloading of the cars difficult. There has been no improvement in labor conditions. Operators in central Pennsylvania have given the 45,000 mine workers in their employ a bonus of 10% based on the men's earnings from Jan. 1, 1917. Contract making is proceeding but is not active. An average price of from $3 to $3.50 at the mines is reported for the high-grade, while ordinary coals are being held at $2.50.

Embargoes have been removed at St. George, Port Reading and South Amboy and many individual shippers are now entirely free of embargoes. Local conditions are spotty and even with buying slow the high prices are generally maintained.

Current quotations, per gross ton, f.o.b. Tidewater, for various grades are as follows:

	South Amboy	Port Reading	Mine Price
Georg's Crk. Big Vein	$7.50@8.00	$7.50@8.00	$5.75@6.00
Tyson	7.25@7.75	7.25@7.75	5.50@5.75
Clearfield	7.25@7.75	7.25@7.75	5.50@5.75
South Frk	7.25@7.75	7.25@7.75	5.50@5.75
Nanty Glo	7.25@7.75	7.25@7.75	5.50@5.75
Som'r. Co.	7.25@7.75	7.25@7.75	5.25@5.50
Que'ho'ing	7.25@7.75	7.25@7.75	5.25@5.50
W. V. Fa'rm't Th'r'qua	7.50@7.75	7.50@7.75	5.50@6.00
Mine-run	7.50@7.75	7.50@7.75	5.50@6.00
West. Md.	7.25@7.75	7.25@7.75	4.75@5.00

BALTIMORE

Car supply again short and traces of softness in the market have been wiped out. Hard coal men complain of premium charges.

Bituminous—The tendency towards softness in the coal market, caused principally by the full car supply, has again been wiped out for the time being at least. The car situation is again tightening and the week started with but a 70% supply in most of the mining regions. Embargoes against some Eastern delivery points also had a tendency to turn some coal back and added to the soft feeling for a time. At present, however, there has been a recovery, at least in part, and better grade steam coals are bringing from $5.50 to $6 mine basis here and West Virginia gas fuels about $4.50 all around. A fair loading for foreign account and the taking of considerable bunker fuel has absorbed much coal and the supply on hand is light.

Following are quotations, mine basis to the trade, for coals of interest here for local consumption and export: Georges Creek Tyson, $6.00; Quemahoning, $5.50 to $6.00; South Fork, $5.50 to $5.75; Somerset, $5.50; Clearfield, $5.00; Freeport, $4.50; Fairmont gas, ¾, $4.50; same, run-of-mine and slack, $4.25 to $4.50.

Anthracite—The hard coal men are complaining that certain sizes are now so scarce that they

are often forced to pay premiums to get prompt deliveries on lots badly needed. As there is also a heavy switching charge here which becomes a decided figure when coal yards are forced to purchase off their usual connections, another burden has been added.

Export—January promises a much better export movement than was recorded in December, when only 52,000 tons was sent out on foreign account. The loading here last week totaled 16,585 tons.

HAMPTON ROADS

New contract prices out. Slight improvement in car supply. Dumpings for 1916 break all records.

A majority of shippers are now quoting prices on cargo business for the year beginning Jan. 1, for both foreign and coastwise shipment, at $4.75 per gross ton. Prices for all rail delivery are based on $3 per net ton at the mines, effective Apr. 1. In view of the present market these prices are very low.

The current demand keeps up and prices are about the same as last week. There seems to be some slight improvement in the car situation, though no stocks have been accumulated as yet.

A shipment was made recently to Pearl Harbor, Hawaiian Islands per the American steamer "Texan." This is rather unusual and is accounted for by the fact that the "Texan" was bound out to the Hawaiian Islands to enter in the sugar trade and, rather than go out light, was able to take a cargo of coal at a low rate of freight.

All records of the Hampton Roads dumpings were broken during the year 1916, when a total of 16,591,575 tons of coal were dumped. This is an increase of 1,799,095 tons over 1915 when the dumpings amounted to 14,812,480 tons. The Norfolk & Western Ry. led the others, with a total of 7,478,365 tons, a decrease of 52,243 tons from 1915, when the total dumpings amounted to 7,530,607 tons. The Virginian Railway dumped a total of 4,284,857 tons, an increase of 1,167,964 tons over 1915, when the dumpings were 3,116,893 tons. The Chesapeake & Ohio Ry. dumped a total of 4,828,353 tons.

Current quotations are as follows: For cargo shipment, coastwise and foreign, $6.50@7; for local delivery $6.50@7 per net ton on track; bunker coal $7.50@7.75 per gross ton plus 10c. per ton trimming. Anthracite $9 per net ton, delivered.

Dumpings at the Hampton Roads piers for the past several weeks were as follows:

	Dec. 15	Dec. 22	Dec. 29	Jan. 5
Nor. & West....	118,293	99,191	101,202	110,673
Ches. & Ohio....	203,551	96,200	38,234	78,839
Virginian.....	124,349	105,205.	98,200	46,220
Total.....	446,193	300,596	237,636	235,732

Ocean Shipping

VESSEL CLEARANCES

The following vessels have cleared with coal cargoes during the past week:

NORFOLK

Vessel	Destination	Tons
Mac[7]	Kingston, Jamaica	2,421
Hermod[4]	St. Thomas, D.W.I.	4,702
Paris[3]	Manzanillo, Cuba	1,550
Ulysses[1]	Cristobal, C. Z.	12,054
Blaamyra[3]	Curaccao, D.W.I.	3,603
Bjornefjord[4]	Buenos Aires, A.R.	4,902
Devon City[4]	Bahia Blanca, A.R.	6,587
Mariechen[4]	Santos, Brazil	3,559
Edward Pierce[4]	San Juan, P.R.	6,311
Huftero[4]	Havana, Cuba	2,018

NEWPORT NEWS

Tea[8]	Italy—Any port	7,157
Harriet[2]	Cienfuegos, Cuba	2,030
Nordland[5]	Havana, Cuba	1,936
E. Starr Jones[5]	Santa Cruz, Teneriffe	1,261
Wm. M. Critchett[5]	Point a Pitre, Guadalaupe	796
Texan[9]	Pearl Harbor, Hawaii	10,000
Edward B. Winslow[2]	Barcelona, Spain	4,978
Nolisement[8]	Dakar, F.W.A.	7,780
Runa[2]	Havana, Cuba	1,330
Manta[2]	Havana, Cuba	2,445
Munorway[2]	Havana, Cuba	5,888
Jerome Jones[2]	Port of Spain, Trinidad	2,822
Wellington[5]	Havana, Cuba	1,900

PHILADELPHIA

Josey	Havana	

BALTIMORE

Carl F. Cressy	Danish West Indies	1,325
Bylyl	Brazil	3,857
Harde	Cuba	2,422
Hilston	Argentina	3,145
Winnebago	Argentina	5,736

[1] Pocahontas Fuel Co. [2] Berwind-White Co. Castner Curran & Bullit. [4] Baker-Whiteley Co. Smokeless Fuel Co. [6] Clinchfield Fuel Co. [7] C. G. Blake Co. [8] C. H. Sprague & Son. [9] West Virginia Coal Co.

OCEAN CHARTERS

Coal charters have been reported as follows during the past week:

PHILADELPHIA

Vessel	Destination	Tons	Rate
Rachael Stevens	Lisbon	1,032	
Lodaner	Havana	2,106	

BALTIMORE

Rodfaxe	Guantanamo	
Winnebago	Buenos Aires	
Bylayl	Rio Janeiro	

ATLANTIC RANGE

Harry Luckenbach	Rio Janeiro	[1]$17.00

HAMPTON ROADS

Millie R. Bohannon	Bermuda	579	5.25
Lewis H. Goward	Bermuda	1,954	5.25
Jungshoved	Berhados	2,462	8.50
Texan	Honolulu	5,635	
Edwin R. Hunt	Marseilles	1,005	25.00
Skogstad	Martinique	2,357	
Helvetia	St. Croix	424	[2]7.00
Mary F. Barrett	St. Lucia or Barbados		

[1] 1,000 tons per day discharge. [2] Loaded and discharged, port charges free; freight prepaid, net.

COASTWISE FREIGHTS

Rates from Hampton Roads are notably firmer, although charters are still infrequent. In view of the hard weather a slight demand was enough to send freights to $3 to Boston and $2.60@2.75 to Fall River and Providence. There is a good deal of interest in the outcome of a discussion this week on the rate to be recognized as the season basis in connection with bituminous contracts. $1.10@1.15 is the current quotation for small barges out of New York for points on Long Island Sound. The bulk of the demand, however, is on bituminous. Most factors are shy about chartering for anthracite, with all the delays that seem the rule. As low as $1.50 has been quoted on barges from New York to Boston.

Ohio Valley

PITTSBURGH

Market stiffened somewhat after sharp decline last week. Car supplies fair but labor becoming short.

The coal market softened almost continuously last week, by a total of about $1.50 per ton, but on Saturday a stiffening began and this has continued this week, prices being up 25@50c. from the lowest point. Last week's decline was attributed to a very material improvement in the car supply, this being due chiefly to the generally favorable weather, unseasonably mild for the time of year. Demand in the retail trade no doubt suffered correspondingly.

This week opened with fairly good car supplies, probably as good as at any time for several weeks, but production has been restricted for several days by the observance of the Greek Christmas, which nominally fell on Sunday, Jan. 7, but has been celebrated more or less riotously both before and after the date.

Negotiations on contracts are slow in starting, buyers feeling that they can hardly lose by waiting. While transportation is expected to be poor and spot prices high, on the whole, for a couple of months, a loosening up is expected before Apr. 1 and there is hardly any contract business to be closed except with consumers whose contracts run out at that time. The expectation remains that the circular price will be in the neighborhood of $2.75.

We quote spot coal: Slack, $3.85@4; mine-run, steam, $4@4.25; ¾-in. gas, $4.50@4.75, per net ton at mine, Pittsburgh district.

DETROIT

Demand is strong for steam coal and supply moderate. Easier tone features domestic trade. Lake shippers are making inquiries for tonnage for 1917.

Bituminous—Jobbers and wholesalers report a strong demand for steam coal from industrial plants and other consumers, while the movement of coal into Detroit is curtailed by embargoes and car shortage to an extent that makes it difficult at times to provide for the requirements of the consumers. A somewhat firmer tone is noted with prices now being quoted at $5.50 to $6 at the mines. Nut, pea and slack is in particularly strong demand and consumers are accepting the larger sizes as a substitute.

Weather conditions having moderated there is an easier feeling in the domestic trade. Consumers appear less worried, doubtless having been reassured by discovering they could get coal when in need of it, though retail dealers are still making deliveries of only one- or two-ton lots and are rejecting orders from new customers.

Anthracite—Congestion on roads east of Detroit is still interfering with regular delivery of anthracite. There is a little coal getting through, however, and anthracite users will probably have their needs provided for during the remainder of the winter, without any serious difficulty.

Lake Trade—More interest is being shown by Lake shippers in obtaining tonnage for the movement of coal during the coming season. Aside from one deal which was made at a carrying charge unlikely to attract other vessel owners, no contracts have been reported. With a strong demand for boats to move iron ore at $1, free from the head of the Lakes, owners estimate that a carrying charge of 50 or 60c. a ton should be paid on coal to compensate for loss of dispatch on the upbound trip.

BUFFALO

Car situation obscuring all other questions. Nobody dares to sell coal till cars are assured. Movement very slow. Bituminous prices not much changed. Anthracite scarce in Canada.

Bituminous—The trade is so dependent on the car supply that jobbers are giving their best time to tracing and urging shipments forward and no relief is anticipated for perhaps several months. There are reports that certain manufacturies are shutting down for lack of coal. It is also felt that the situation is growing worse. So far the winter has been more severe in this section than is usual so early, but there is now a lull and it is hoped that the worst weather is over for awhile.

There is now a call for annual contracts, but for the most part the shippers and consumers are about 50c. apart on prices. If shippers would accept $2.50 for good Pittsburgh coal they would do considerable business, but as a rule they are asking $3.

On a basis of $4.75@5.25 mine price, for Pittsburgh three-quarter, quotations run as follows per net ton, f.o.b. Buffalo:

Youghiogheny Gas	$6.25@6.75
Pittsburgh Steam	6.00@6.50
Ohio No. 8	6.00@6.50
Cambria Co. Smithing	5.90@6.40
Allegheny Valley	5.80@6.30
Pennsylvania Smokeless	5.85@6.35
All Slack	5.80@6.30

Anthracite—The trade is in fairly satisfactory condition in the city. The Lake shippers have insisted on a large part of the coal being diverted into the local trade and the result is that they are giving the retailers all they can handle. The chief difficulty is now in Canada, but that is due to the rail situation. Coal roads on this side are now obliged to send their trains long distances into Canada or see the coal held up here an indefinite time. As a consequence Canadian retailers are coming here in great numbers, clamoring for coal.

Now for about the first time the anthracite coal men are among the ones most desirous for a light winter. They are finding the strain severe enough at that. So far the winter has been much colder than the average.

Anthracite prices are steady so far as the standard companies are concerned, the differences between them being only a few cents a ton, but the independent companies, not being bound by any schedule, are asking what the consumer will pay, which is about $3 per ton premium.

TOLEDO

Warm weather relieved the situation just as local institutions were threatened with dire results through the lack of coal. The city law director made the statement that if necessary coal in local railroad yards would be confiscated to run the water-works pumping station; other departments of the city and county are worrying over the situation, notably the infirmary, which has only a couple of weeks supply and is threatened with famine through the failure of the Johnson Coal Co. to fulfill its contract with the city.

State public utilities commission inspectors recently made a probe of the car congestion in Toledo and ended by paying Toledo a high compliment on the efficient manner in which a bad situation has been met. Conditions here were reported as not being nearly so bad as in Detroit. Small cities in this section of the state are facing serious difficulties and are fearful of a famine which will entail real suffering.

CLEVELAND

Mild weather has caused prices to decline slightly. Car supply better and daily receipts more than doubled.

The mild weather the past few days has greatly assisted the railroads in moving shipments and the daily receipts at Cleveland have more than doubled. This has caused a slight decline in prices on steam grades while the warm weather has caused some falling off in wholesale prices on domestic grades. Railroad embargoes still in effect on several lines has a tendency to force the consumer located on such lines to pay a higher price. This is an unnatural condition caused wholly by the railroads but it seems that the state and Federal investigators have not deemed it important enough to look into.

The car supply at the mines has improved and if this continues, no doubt prices will ease off a little more, while on the other hand if the weather should turn cold and stormy the probabilities are prices would stiffen up again as none of the large consumers have any great amount of coal in stock.

Following are the market prices per short ton, f.o.b. Cleveland:

	Three-quarter	Mine-run	Slack
No. 8	$6.00	$6.00	$5.75
Cambridge	6.00	6.00	5.75
Middle Dist.	6.00	6.00	5.75
Hocking	6.00	6.00	5.75
Yough'gheny	6.50	6.50	6.25
Pittsburgh	6.50	6.50	6.25
Pocahontas	....	7.50	....
Fairmont	6.00	6.00	5.75

COLUMBUS

Milder weather causes a slight recession and the market is spotty. Prices vary over a wide range. Outlook considered bright.

The retail trade rules strong and stocks are slightly larger as dealers took advantage of the lull to secure surpluses. Pocahontas is strong and the same is true of West Virginia splints. There is also a good demand for anthracite at former prices which are above the $10 mark.

There is some shortage of steam grades, especially nut, pea and slack. The shortage of cars is still having a marked effect; congestion at railroad junction points is also a potent factor in keeping up prices. Railroads are taking a large amount for the movement of freight. Embargoes are frequent, although some have been taken off during the past week. Certain large manufacturing plants have been compelled to close down temporarily because of lack of fuel. The shutting off of the natural gas supply from manufacturies has still further complicated the situation.

The production in most Ohio districts during the past week was considerable above that of the previous week. A better car supply, especially on the Hocking Valley, had the effect of increasing the output. Car supply was also better in the eastern Ohio field.

Prices on short tons, f.o.b. mines are as follows:

	Hocking	Pomeroy	Eastern Ohio
Rescreened lump	$5.00	$5.00	.....
Inch and a quarter	4.75	5.00	$5.00
Three-quarter inch	4.75	5.00	5.00
Nut	4.75	5.00	5.00
Egg	4.75	4.75	.....
Mine run	4.50	4.75	5.00
Nut, pea and slack	4.50	4.75	4.75
Coarse slack	4.50	4.75	4.75

CINCINNATI

Milder weather has decreased domestic demand, but scarcity and high prices still prevail. Embargoes and shortage of cars the principal factors. Large steam consumption.

The moderate weather has reduced the domestic consumption, and demand has slacked off some. Inasmuch as colder weather is certain to come soon, however, the relief is only temporary, and the continued inability of the railroads to furnish cars makes it evident that the trade will continue to experience difficulty in meeting the demand.

The steam situation, backed by a persistent heavy demand, remains extraordinarily strong. Prices are giving indications of sharp advances from the present high levels, which are around $1@1.25 for the better grades of West Virginia and Kentucky bituminous nut and slack, and slightly less for mine-run. Traffic conditions will have to improve materially before there is any possibility of an easier market.

LOUISVILLE

Embargoes keep coal selling organizations busy. Cold weather stiffening prices.

Action of the railroads in imposing and lifting embargoes according to car and traffic conditions have been keeping the Kentucky selling organizations on the long distance telephones to reach territory as soon as it can be shipped into. The mild weather following the freeze has been succeeded by heavy rains which threaten to hamper operations and this with the threatened cold wave, has stiffened the market, although prices are still off as compared with what they have been. Efforts of the railroads to return empties during the holidays have resulted in a better supply of cars, while, with labor generally returning to work, production is heavy.

Eastern Kentucky is quoting block at $3.50@3.75; mine-run, $3.25@3.75; nut and slack, $3.50@4. Western Kentucky quotes lump at $2.50@3; mine-run, $2.40@2.75, and nut and slack around $2@2.25, all f.o.b. the mines.

BIRMINGHAM, ALA.

Market quiet due to warm, unseasonable weather. Prices are off about 50c. on an average. Movement is heavy, as a result of improvement in car supply.

With the exception of one day, the weather during the past week has been mild, and has had a deleterious effect on the coal market, new business not being very plentiful while prices were scaled down on an average of probably 50c. per ton. Quotations are about as follows per net ton mines on steam grades: Big Seam and Carbon Hill mine-run, $2.75; Pratt mine-run, $3; Cahaba and Black Creek, $3.50. Domestic quotations: Montevalo lump, $4.25@4.50; Cahaba and Black Creek lump $4, and Carbon Hill, $3.50 per net ton f.o.b. mines.

Coke

CONNELLSVILLE

Larger coke movement, but some shortage remains. Very high prices done on contracts.

The movement of coke has greatly improved in the past 10 days, car supplies being much better. As a majority of the furnaces were definitely short of coke, and some so short that they had to bank, the improvement in shipments has not resulted in coke becoming plentiful, the shortage not having been made up entirely. The Carnegie Steel Co. had 14 furnaces banked on Dec. 24 and now has only two banked, but even a single furnace banked is one too many, hence there is still an eager demand for coke and the spot market is off only about $2, being still at an extremely high figure.

Of more moment than the high prices ruling of late for spot coke is the fact that two or three contracts for first-quarter have been made at $8, these being followed by one at $8.50, the total involved in these contracts being probably about 25,000 tons a month. For delivery over the whole year there is very little negotiation, operators being disposed to ask $6 or more while consumers prefer to take chances.

Foundry coke has softened a trifle as to spot, but on contract has brought higher prices than ever, up to $8.50 for the first six months of the year, while $8 seems to be difficult to obtain as a quotation from producers, and it is claimed that coke could be sold at this figure or higher.

We quote: Spot furnace $9@10; contract, $6@8.50; spot foundry, $11@12; contract $8@8.50, per net ton at ovens.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ended Dec. 30 at 373,464 tons, a decrease of 2037 tons, and shipments at 325,976 tons, a decrease of 2999 tons.

Buffalo, N. Y.—Every week shows a greater scarcity of coke. The furnaces of this district continue to run, but with much difficulty and prices are about what the producer cares to ask. Sales in quantity as high as $14 for foundry at the ovens are reported. At $12 the addition of $1.85 freight would make the Buffalo price $13.85 for foundry, with lower grades about $2 less. The situation is decidedly more serious than is the case with either bituminous or anthracite coal, which is saying about all that could be said.

Chicago—The coke shortage is still quite pronounced, and manufacturers and retailers are bidding up prices in order to get supplies. Difficulty in obtaining spot shipments is aggravated, and prices cannot be quoted with any degree of accuracy. Nominal prices per net ton, f.o.b. cars Chicago, are as follows:

Connellsville	$10.00@12.00
Wise County	10.00@12.00
By-Product Foundry	11.00@12.00
By-Product Domestic	10.50@11.00
Gas House	9.00@10.00

Birmingham, Ala.—There is a strong inquiry for furnace and foundry coke, but none of the former and little of the latter are offered in the spot market. Foundry coke is quoted at $11 per net ton ovens. One of the larger foundry coke producers had to divert considerable coke of this grade for furnace use during the holidays. The movement is not being seriously handicapped now, as little trouble is experienced in securing equipment.

Middle Western

GENERAL REVIEW

Warmer weather easies up the market. All sizes of Western bituminous coals selling around $4. Production below normal. Railroad movement improved.

Despite much higher temperatures prices are about on the same level as last week and production is still below normal. While the railroads have speeded up shipments from the mines, they are very slow in returning empties. Transportation conditions at the larger terminals have improved, and the congestion of ten days ago has about disappeared. The average price of Western coals is about $4 and there is not much difference in the prices for mine-run, screenings or domestic lump from any district.

Efforts have been made by large buyers to lower the market prices of spot coal, but free shipments have been absorbed without difficulty at very little recession. Progressive demurrage charges now in effect are causing sellers to move shipments more quickly and on a small tonnage this has caused as much as 50c. reduction in price, in order to avoid terminal charges. More coal seems to have been shipped on consignment during the last ten days, and the new demurrage rules make it imperative that this coal be sold promptly on arrival. The jobbers who formerly maintained a reserve supply on the tracks for prompt delivery to consumers who lacked storage facilities, have reduced consignment coal to such a degree that many steam users are no longer protected.

Mine labor has been very slow in resuming work, and a number of operations did not have their full quota of men until toward the close of last week. Retailers and steam consumers are still short and in order to get coal for immediate requirements they have been paying maximum prices on free tonnage. Negotiations are under way for the movement of Lake coal next year, with every possibility that the vessel owners will demand 60 to 70c. to Lake Superior and Lake Michigan next year, as compared with 35c. heretofore. Increased orders from Northwestern points are reported at high prices.

Railroad embargoes here and there still cause considerable confusion. A slight lull in the retail market is noticeable owing to warmer weather, but this has had hardly any effect on the wholesale trade. Many steam consumers who have not been successful in making contracts are bidding in the open market for steam sizes, but have only been able to obtain supplies on a hand-to-mouth basis even during the last few days of warmer weather.

CHICAGO

Prices strong notwithstanding warmer weather. Anthracite very short and selling at unprecedented high prices. Smokeless shipments restricted. Movement of coal in terminals improved.

Orders are still being received by the southern Illinois mines in excess of production, and operators are sold ahead for a month to come. The car supply has improved owing to the railroads being able to get cars back to the mines during the holiday period. Lump coal is mostly sold at $4, although a few spot shipments have been priced at $3.75. Car supply in the Williamson County field averaged about 50 per cent. of requirements and prices from this district are very firm. Saline County is shipping little free coal, most of the output being moved under contracts.

The Springfield situation shows little change. Steam demands are still very strong.

Warmer weather has caused a slight easing in the demand for Indiana domestic sizes but steam coals are still urgently wanted. Car supply at the Indiana mines averages from three to five days per week. More grades seem to be available for Indianapolis shipment than to Chicago.

Offerings of free smokeless coals have been very limited due to Eastern embargoes and shortage of tonnage. Prices are firm at around $5 to $5.50 for both prepared sizes and mine run.

Quotations in the Chicago market are as follows, per net ton f.o.b. cars at mines:

	Springfield	Fulton & Peoria Cos.	Clinton & Sullivan Cos.	Green & Knox Cos.	Carterville
Domestic lump	$3.50@4.00	$3.50@3.75	$3.50@4.00	$3.50@3.75	$4.00@4.25
Steam lump	3.50@3.75	3.25@3.50	3.50@3.75	.....	.....
Egg	3.50@3.75	3.50@3.75	3.50@4.00	3.50@3.75	3.75@4.00
Nut	3.25@3.50	3.25@3.50	3.25@3.75	.....	.....
Mine-run	3.50@3.75	3.50@3.75	3.50@3.75	3.50@3.75	.....
Screenings	3.50@3.75	3.25@3.50	3.50@3.75	3.50@3.75	.....

	Wilmson. & Franklin. Cos.	Saline & Harrisburg	Poca. & W. Va. Smokeless	Penna. Smokeless	Eastern Kentucky
Lump	$3.75@4.00	$3.75@4.00	$5.00@5.50	$5.00@5.50	$5.00@5.25
Egg	3.75@4.00	3.75@4.00	5.00@5.50	5.00@5.50	5.00@5.25
Nut	.....	3.75@4.00	.....	.....	4.00@4.75
No. 1 nut	3.75@4.00	.....	.....	.....	.....
No. 2 nut	3.75@4.00	.....	.....	.....	.....
No. 3 nut	3.75@4.00	.....	.....	.....	.....
No. 1 washed	3.75@4.00	.....	.....	.....	.....
No. 2 washed	3.50@3.75	.....	.....	.....	.....
Mine-run	3.50@3.75	3.50@3.75	4.75@5.25	5.00@5.50	3.75@4.00
Screenings	3.50@3.75	3.50@3.75	.....	.....	.....

Hocking Lump $3.75@4.00. Splint Lump $4.00.

Hocking coals have been scarce, with prices firm at from $3.75 to $4.

Kentucky quotations cover a wide variation, some of the higher grades selling at $5, while inferior coals have realized around $3.75 to $4. Considerable Kentucky tonnage is now being moved to the Southwest at fancy prices. Embargoes prevent the forwarding of the usual tonnage to Northern points.

The supply of anthracite on the docks is exhausted, and the large shippers have reconsigned all coal in transit by rail to Chicago proper to points West which will leave the city without much of a supply of hard coal. Some of the

big companies have advanced their circular prices 25c. a ton, while independents are realizing from $11 to $12 per ton on small lots. There is a disposition on the part of wholesalers to quote prices f.o.b. mines instead of on a delivered basis at Chicago or Buffalo. The situation on anthracite here is the worst in the history of the trade in Chicago.

Shipments continue light and with no indications of any increase.

ST. LOUIS

Warm weather has depressed the market and the domestic sizes are in light demand. Steam coals strong. More plentiful car supply has also aided in weakening the market. Railroads buying heavily.

The warm weather during the first week in January depressed the market, although steam coals are holding up better than domestic grades. There have been large orders for railroad coal placed at prices less than the open market quotations, and this has absorbed a big tonnage that would otherwise have forced prices way down. Most of these railroad orders provide for the necessary equipment and as a result there seems to be plenty of cars on all the roads in the Illinois field.

Up to the present there has been little coal moving to the Detroit and Toledo territories as was anticipated and there has also been a general falling off in the demand from country district. In isolated places, however, there has been some buying in rather large quantities on account of the low prices.

The circular price of the Williamson-Franklin County domestic and steam coals is much higher than St. Louis can pay, and a very small tonnage of these grades is moving in here. The demand in the country, however, seems to take care of the supply. Domestic coal from this field is quoted at from $3.75 to $4 at mines. Coal from the Mt. Olive district is moving readily to Chicago and Northern points, and St. Louis is not taking as much of this as is customary. In the Standard field coal from mines on the short line coal roads, which work every day, is taken up entirely in the St. Louis market, and the tonnage of Standard coal consumed here this year will more than double that of any previous year.

The Peabody Coal Co. has just completed contracts with a large number of Williamson County mines that call for 150,000 tons of mine-run coal to be shipped before Apr. 1. The entire outputs of some small mines are included. The ultimate destination of the tonnage is not known but it will move through Chicago. It is understood that the price paid was from $2.75 to $3 per ton at the mine for mine-run coal.

The prices prevailing in St. Louis are about 25c. lower than for outside shipment, and are as follows, per net ton f.o.b. mines:

	Williamson and Franklin Co.	Mt. Olive and Staunton	Standard
6-in. lump	$3.25@3.50	$3.25@3.50	$2.35@2.75
3x6-in. egg	3.25@3.50	3.25@3.50	2.35@2.75
2x3-in. nut	3.25@3.50	3.25@3.50	2.25@2.50
No. 2 nut	3.25@3.50	.....	2.25@2.50
No. 3 nut	3.25@3.50	.....	2.25@2.50
No. 4 nut	3.25@3.50	.....	2.25@2.50
No. 5 nut	3.25@3.50	.....	2.25@2.50
2-in. screenings	3.50	2.75@3.00	2.50
2-in. lump	.....	.....	2.25@2.50
3-in. lump	.....	3.25	2.25@2.50
Steam egg	.....	3.25	2.25@2.50
Mine run	3.00@3.25	3.00	2.00@2.25
Washed			
No. 1	3.50	3.50	2.50
No. 2	3.25@3.50	3.25@3.50	2.25
No. 3	3.25@3.50	.....	.....
No. 4	3.25@3.50	.....	.....
No. 5	3.25@3.50	.....	.....

General Statistics

IMPORTS AND EXPORTS

The following is a comparative statement of coal imports and exports of the United States for October, 1915-16, and for the 10 months ended October 1914-15-16, in long tons:

Imports	October 1915	October 1916	Ten Months 1914	Ten Months 1915	Ten Months 1916
Anthracite, total	279	808	19,295	2,803	5,434
Bituminous, total	133,096	106,706	1,088,608	1,210,895	1,300,034
United Kingdom	477	.....	8,672	16,587	5,118
Canada	90,135	80,913	840,447	959,769	1,162,502
Japan	16,100	.....	50,099	78,219	77,187
Australia	26,177	928	187,337	153,533	29,007
Other countries	207	24,865	2,053	2,787	26,220
Coke	4,443	5,264	93,936	41,015	45,907
Exports					
Anthracite total	361,264	343,208	3,406,491	2,954,013	3,543,720
Canada	339,658	334,433	3,351,569	2,878,523	3,464,773
Argentina	.....	.....	.....	2,469	1,530
Brazil	.....	.....	6	2,415	428
Uruguay	.....	.....	.....	605	.....
Other countries	21,606	8,775	54,916	70,001	76,989
Bituminous total	1,782,452	1,644,464	12,254,757	14,206,584	16,410,487
Italy	282,067	98,928	.....	2,630,937	1,628,567
Canada	1,093,643	1,067,966	8,221,467	6,776,098	10,164,447
Panama	49,036	38,069	239,837	438,455	341,105
Mexico	12,809	17,857	289,259	253,412	172,140
Cuba	103,172	82,779	908,324	946,977	1,067,393
West Indies	61,105	33,538	510,167	414,545	374,038
Argentina	12,802	92,966	207,904	731,821	819,041
Brazil	40,119	81,855	235,453	584,313	703,510
Uruguay	17,029	14,208	71,819	152,094	143,522
Other countries	110,670	116,298	1,570,527	1,277,932	996,724
Total coal	2,143,716	1,987,672	15,661,248	17,160,597	19,954,207
Coke	85,954	83,489	511,207	659,058	855,007
Bunker coal	641,072	645,202	6,285,770	6,319,235	6,604,821

NORFOLK & WESTERN

Distribution of shipments for November of last year were as follows:

	Shipped	Tipple	Total
Pocahontas	1,389,202	11,573	1,400,775
Tug River	310,884	3,142	314,026
Thacker	245,621	13,793	259,414
Kenova	91,571	7,207	98,778
Totals	2,037,278	35,715	2,072,993

Shipments of coke, entirely from the Pocahontas field amounted to 129,607.

CHESAPEAKE & OHIO RY.

The following is a comparative statement of the coal and coke traffic from the New River, Kanawha and Kentucky districts in November and for the 5 months ending November for years 1915 and 1916, in short tons:

Destination	November 1916	%	November 1915	%	Five Months 1916	%	Five Months 1915	%
Tidewater	495,739	23	367,659	17	2,202,462	20	2,165,030	20
East	227,274	11	241,995	11	1,047,109	9	1,026,523	10
West	1,212,555	57	1,331,292	62	6,795,477	61	6,671,802	62
Total	1,935,568		1,940,946		10,045,048		9,863,355	
From Connections								
Bituminous	200,809	9	200,297	10	1,072,039	10	907,383	8
Anthra. (local)	256	...	188	...	1,350	...	1,109	...
Anthracite	1,237	...	934	...	7,258	...	6,827	...
Total	2,137,870	100	2,142,365	100	11,126,128	100	10,778,674	100
Company fuel	191,642		185,432		866,533		838,173	
Total	2,329,512		2,327,797		11,992,661		11,616,847	
Coke	50,157		38,491		227,713		149,810	

COAL MOVEMENT

Fuel shipments over 13 leading Eastern carriers for October and 10 months of 1915-16 were as follows, in short tons:

Classes and Railroads	October 1915	October 1916	10 Months 1915	10 Months 1916
Anthracite:				
Baltimore & Ohio	173,613	237,060	1,070,391	1,325,720
Buffalo, Rochester & Pittsburgh	14,281	12,637	125,667	133,221
Buffalo & Susquehanna	1,175	762	5,823	5,521
Chesapeake & Ohio	1,734	1,581	13,232	13,533
Erie	914,736	793,339	7,677,483	7,735,644
Huntingdon & Broad Top Mountain	111	230	450	804
Pennsylvania	1,084,739	1,156,690	8,679,339	9,986,566
Pitt burgh & Lake Erie	152	127	574	721
Pittsburgh, Shawmut & Northern	584	971	8,344	9,541
Virginian	163	204	1,644	2,967
Western Maryland	40,217	79,882	279,244	336,342
Total	2,231,505	2,283,492	17,862,191	19,550,580
Bituminous:				
Baltimore & Ohio	3,312,195	2,945,234	27,487,539	29,770,983
Buffalo, Rochester & Pittsburgh	803,521	805,407	6,181,473	7,863,223
Buffalo & Susquehanna	115,030	127,678	863,322	1,257,174
Chesapeake & Ohio	2,175,256	2,223,080	18,747,551	22,613,523
Erie	818,701	758,661	5,580,282	7,174,185
Huntingdon & Broad Top Mountain	120,951	111,389	833,533	981,733
New York Central (Buffalo and east)	656,023	644,450	5,147,362	6,425,422
Norfolk & Western	2,753,601	2,647,943	22,056,243	26,057,812
Pennsylvania	4,304,366	3,973,141	35,908,943	40,496,441
Pitt b rgh & I ake Erie	1,207,533	1,138,676	8,436,576	9,567,102
Pittsburgh, Shawmut & Northern	149,742	300,501	1,758,531	2,534,204
Virginian	339,820	555,458	3,255,524	4,558,677
Western Maryland	847,598	842,492	7,187,501	7,246,528
Total	17,604,437	17,074,110	143,444,380	166,547,007

Foreign Markets

GREAT BRITAIN

Dec. 21—Owing to admiralty demands, the market is exceedingly bare of coal. The demand is likely to continue, and with the near approach of the Christmas holidays, prices are likely to advance in the near future, although at present they are merely maintained.

Best Welsh steam	Nominal
Best seconds	Nominal
Seconds	$6.96@7.20
Best dry coals	6.48@6.72
Best Monmouthshires	6.60@6.84
Seconds	6.24@6.48
Best Cardiff smalls	4.56@4.80
Cargo smalls	4.20@4.32

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f.o.b. Newport, both net, exclusive of wharfage.

Freights—With a better demand for tonnage, the freight market is showing a distinctly firmer tendency. Limitation rates (indicated *) remain unaltered for the present.

Gibraltar	$12 00	Port Said	$19 20
Marseilles	14 04*	Las Palmas	9 60
Genoa	14 28*	St. Vincent	10 20
Naples	13 80*	River Plate	12 60
Alexandria	19 80		

I. C. C. Decisions

No. 8104. Oakdale Coal Co. vs. Denver & Rio Grande R.R. Submitted Oct. 15, 1915. Decided Dec. 1, 1916.

Charges for three carloads of coal from Tropic, Colo., to Kearney, Nebr., and to Beloit and Grainfield, Kan., originally consigned one to Kersey and two to Bennett, Colo. not shown to have been unreasonable. Complaint dismissed.

No. 8105. Thompson Brothers Lumber Co. vs. Missouri, Kansas & Texas Ry. Submitted Jan. 19, 1916. Decided Nov. 25, 1916.

Rate charged by defendants for the transportation of coal in carloads from Degnan, Buck, Lutie, and Wilburton, Okla., to Sequoyah, Tex., found to have been unreasonable and unduly prejudicial. Reparation awarded.

No. 8113. Berry Coal & Coke Co. vs. Tonopah & Goldfield R.R. Submitted Jan. 25, 1916. Decided Nov. 25, 1916.

Minimum weight of 50,000 pounds applicable on coke from Chicago, Ill. to Tonopah and Millers, Nev., not found unreasonable or unduly prejudicial. Complaint dismissed.